





CASE-MIX OUTCOMES AND RESOURCE USE IN NURSING HOMES

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## PREFACE

The overall purpose of this project was to use a number of large data sets to study the variation in outcomes for nursing home residents and the relationship between case-mix adjusters and these outcomes. The project focused on outcome measures such as physical functional change, discharge status and other quality indicators that were available in the data. Data were obtained from the National Health Corporation (NHC), New York, and Texas. In addition, results from an ongoing study of nursing homes in Rhode Island are compared with analyses of NHC and New York data. The hope is that this project will provide needed insights into the conceptual, methodological, and operational issues associated with designing and implementing a case-mix adjusted outcome system for the assurance of quality care in nursing homes.

The report includes nine chapters. The first chapter reviews the major conceptual and methodological issues associated with the use of case-mix outcomes for quality assurance and regulation in nursing homes and serves as an introduction to the issues and results being presented. It is meant as a brief overview of the major issues; it is not meant to be exhaustive, however.

Chapter 2 presents analyses of a new admission cohort developed from the NHC data. Estimates of the probabilities of functional change and discharge (death, hospital, home, other) for each of the first three months and each of the next three quarters are presented. Variation by age, sex, marital status, and functional state are presented.

The third chapter reviews the methods used to analyze the three longitudinal data sets. Chapters 4-6 present the results of analyses of quality indicators and functional change measures by case-mix adjusters for each of the three data sets. Chapter 7 compares the data collection strategies used in these data sets. Chapter 8 summarizes the overall usefulness of the results for establishing standards and for identifying appropriate case-mix adjusters. The chapter includes a discussion of future research.

In Chapter 9, multivariate models of the relationship between resident characteristics and six month outcomes (functional improvement, functional decline and death) are validated with data from New York State nursing homes and National Health Corporation nursing homes. These models were estimated with data from Rhode Island as part of a study funded by the National Center for Health Services Research.



# A LONGITUDINAL STUDY OF CASE-MIX OUTCOMES AND RESOURCE USE IN NURSING HOMES

## EXECUTIVE SUMMARY

This project was designed to study the variation in outcomes for nursing home residents and the relationship between case-mix adjusters and outcomes. Employing several large, longitudinal, administrative data bases, the project focused on quality-based outcome measures. A population of residents newly admitted to the nursing home as well as several different cross-sectional samples of residents in different states were studied.

Clinically relevant parameters were defined from both the literature and the consensus of an outside panel of long-term care experts for use as indicators of the quality of outcomes experienced by nursing home residents. Outcomes examined include changes in physical function, in clinical conditions, and in the receipt of services, as well as discharge status. Base rates of change in these parameters were computed using several different nursing home populations to determine the variations on outcomes across populations and among subgroups of these populations. In addition, resident characteristics found to be predictive of functional change and of death based on analyses of research quality data were compared to results obtained when the same models were applied to data collected by two ongoing administrative data systems.

Analyses were designed and specific variables were selected with a view toward their potential use in a large-scale case-mix adjustment system for quality assurance in nursing homes. This project provides insights into the conceptual, methodological, and operational issues associated with designing and implementing a case-mix adjustment system for the assurance of quality care in nursing homes.

The study consisted of three major areas of analysis. The first set of analyses estimated probabilities of functional change and discharge for residents newly admitted to the nursing home. The second set of analyses employed three different nursing home populations to describe the relationship between case-mix adjusters and quality indicators. The final phase of analysis was the validation of three previously developed statistical models which predict functional improvement, functional decline and death for nursing home residents.

The first set of analyses describe probabilities of functional change and discharge locations for a cohort of residents newly admitted to the nursing home. Using data from the National Health Corporation facilities, the probability of the competing outcomes of functional improvement, functional decline, discharge dead, to home, and to the hospital were computed. Probabilities were computed for each of the first three months in the facility and quarterly for the entire first year of stay.

Early in the nursing home stay, a positive outcome (either functional





improvement or discharge to home) was found to be strongly associated with independence in physical functioning of the residents. The longer residents remained in the facility, the less likely they were to leave, regardless of functional level. This was particularly true for those who remained in the facility for at least nine months.

Variations in the transition probabilities were examined to see if there were significant differences for certain sub-groups of residents. For residents with few limitations in performing activities of daily living (ADL), Medicare-covered residents were more likely to be discharged to home than non-Medicare residents; among those with poorer physical functioning, Medicare residents were more likely to die in the facility than their non-Medicare counterparts. This contrast was most dramatic in the first month after admission, although these differences persisted throughout the first six months of stay. Within a given functional level, married residents were more likely to be discharged home than unmarried residents; however, this did not hold for every ADL level and was most evident in the first six months of stay. Results by age and by gender were also tested, but there were no patterns to the findings.

The second set of analyses employed three different nursing home populations to describe the relationship between case-mix adjusters and quality indicators. The data used were based on assessments performed on residents of the National Health Corporation (NHC) facilities (N=4,595), a sample of facilities in New York State (N=11,795), and a sample of Medicaid-covered residents of facilities in Texas (N=4,512). Each of these administrative data collection systems had its own assessment tool. Despite the limitations due to the differences in the way assessments were conducted, each data set afforded reasonably comparable information, collected at six month intervals on the same large number of residents, from a range of facilities. This permitted comparison across data sets to provide basic information about the range of outcomes observed, and to determine whether the results obtained in one data set were consistent with results obtained using a different data collection instrument and a different population.

Functional change was examined as an outcome in both the NHC and New York data. Activities of daily living, specifically the ability to perform the daily activities of eating, transferring from bed to chair, mobility, continence, and toileting, were analyzed. Each activity was examined by looking at changes in functional level over a 6-month interval, beginning with a cross-sectional point in the resident's stay. For each of the activities, approximately three-fourths of the residents did not change in their ability to perform the activity during the study period. Changes which were recorded were most commonly one-level changes reflecting changes of smaller increments of ability rather than dramatic shifts. In most cases decline was twice as common as improvement. None of the potential case-mix adjusters tested were consistently associated with functional changes in these cross-sectional populations although changes in functional abilities were more consistently associated with age than with diagnoses.

In addition to physical functioning, clinical conditions and service use measures were studied in all three populations. Outcomes examined were decubitus ulcers, urinary tract infections, contractures, the use of restraints, and bladder and bowel training programs. Measures constructed were cross-sectional prevalence, 6-month recovery, and 6-month incidence





rates. Analyses were stratified by age, mental status, and a set of selected diagnoses.

Substantive differences in the prevalence and changes in these parameters were found across the data sets, although these are at least partially due to definitional differences. Despite differences in the data collection strategies, definitions used, and populations studied, some common patterns were identified. Functional status, as measured by the ability to eat and transfer, was the patient characteristic most consistently related to both the prevalence and incidence of decubitus ulcers, urinary tract infections, contractures and restraints. The case-mix measures tested were not as successful at identifying subgroups of residents more likely to recover from the conditions examined.

Decubitus ulcers were present among 10% to 16% of residents. Six-month recovery rates ranged from 38% to 51% of cases, while between 3% and 10% of the populations acquired sores. Physically dysfunctional residents were more likely to have a decubitus ulcer or acquire one within the six month time frame if they did not initially have a sore. Prevalence of pressure sores was also high among comatose residents and those with a diagnosis of stroke.

Urinary tract infections were recorded as present for between 8% and 13% of those studied. Between 17% and 30% of those with infections were reported to no longer have a urinary tract infection six months later, while between 2% and 9% developed infections over the same period of time. Residents with a urinary catheter and more dysfunctional residents were at greatest risk of having and acquiring urinary tract infections.

The prevalence of contractures ranged from 3% to 31%. Recovery rates ranged from 3% to 12%, and new cases were found for between 2% and 5% of residents across the samples. Those age under 65 and comatose residents were also likely to have contractures. ADL dependent residents and those with stroke were not only more likely to have contractures, but were also at greatest risk of developing them.

Differences in the definitions of what devices constitute restraints are responsible for the wide range of findings regarding their use. Between 13% and 57% of nursing home residents studied were restrained. Restraints were discontinued for 6% to 15% of those who remained in the facility. New orders for restraints were implemented for between 4% and 23% of residents who did not already use restraints. Residents who were more physically dependent or confused were more likely to be restrained and they were more likely to become restrained if they were not originally restrained.

Differences in what constitutes a bladder/bowel training program influence the number of residents participating in such a program. Overall use of bladder and bowel training programs was low, used by between 2% and 14% of the populations studied, but was more common among residents needing assistance in eating and transferring and those assessed as confused. Programs were initiated for only 0.2% to 5% of nursing home residents. Philosophies about the duration of such a regimen are reflected in the rates of discontinuation which ranged from 31% to 99% over six months.

The final phase of analysis was the validation of three multivariate models which predict functional improvement, functional decline and death for



nursing home residents. The models were initially developed as part of a project funded by the National Center for Health Services Research ("Risk of Functional Change in Nursing Homes," Grant Number HS05625) using data from a randomized trial of Patient Care and Services (PaCS) survey conducted in all Rhode Island nursing homes. The models are based on 6-month outcomes for a cross-section of residents. The validation of these models tested not only the consistency with which resident characteristics were associated with functional improvement, functional decline and death, but also tested the ability to apply existing administrative data to a research model.

Using data from New York State and National Health Corporation nursing home residents, these three models were re-estimated. Overall, the majority of terms in the three models were related to the outcomes as found in the Rhode Island models. There was some variation in the magnitude, direction and significance of the relationships, especially those sensitive to differences in practice patterns, policies, or definition (e.g. receipt of therapies and services and diagnoses of affective mental disorders). Short length of stay, poor physical functioning, and diagnosis of cancer were related to death in both Rhode Island and NHC. In each of the populations modeled, schizopohrenia/mental retardation and disruptive behavior were related to decline, while short length of stay and lack of severe mental impairment were related to functional improvement.

Despite the limitations due to lack of comparability across different data sets, the administrative data used in this project have provided basic information about the range of outcomes in nursing homes based on current practice. In addition, variations in these outcomes across different populations have been documented.

These outcome variations are not fully explained by differences in case-mix, although adequate consideration of case-mix adjusters is essential to cross-population comparisons. The appropriateness of specific case-mix adjusters needs to be decided for each individual outcome investigated.

Stronger conclusions about the reasons for differences in outcomes will be possible from future cross-comparisons when standard definitions and consistent assessment protocols are established. The maintenance of adequate quality control procedures to ensure the reliability of the data is imperative. Further research will be facilitated by the Congressional mandate of a uniform minimum data set for nursing homes and the standardized resident assessment system for nursing home residents which is currently being developed.





## CHAPTER 1

### INTRODUCTION

Nursing homes provide around-the-clock services in an institutional setting to residents who have physical and/or mental disabilities that do not allow them to live in the community. These services affect both the quality of care and the quality of life and are aimed at maintenance as well as restoration of function. They are multifaceted and include room and board; personal, skilled nursing, restorative and rehabilitative care; and infection control. Nursing homes also provide opportunities to participate in organized social activities and an environment which is safe, comfortable, and allows social interaction.

Because the nursing home offers a multifaceted product, there are a number of goals associated with good care that can be attributed to the nursing home. However a general goal which incorporates aspects of both quality of life and quality of care can be described as follows: a nursing home is responsible to restore residents to or maintain residents at the optimal level of functioning and quality of life despite physical and mental impairments. For residents who enter the nursing home to rehabilitate from an acute episode, the optimal course is increasing independence and discharge after a short stay. For others, the optimal course may be continued deterioration and ultimate death, while minimizing pain and discomfort.

The multiplicity of goals may result in conflicts in care planning. The trade-off between maximizing both safety and functional independence is an important example of potentially conflicting goals. Residents may be restrained or put in wheel chairs for safety reasons, but this may result in an increased risk of incontinence and immobility. (Gray, Bassey, and Young, 1985; Baker, 1985). Judgments have to be made to prioritize goals and determine what the mix of target outcomes should be. Because these decisions are value laden, consensus may be very difficult to achieve.

This research project was designed to study the variation in outcomes for nursing home residents and the relationship between case-mix adjusters and these outcomes. A variety of approaches and populations were used to study the results of the structure and process of nursing home care. This first chapter provides an overview of the major conceptual and methodological issues associated with the use of case-mix adjusted outcomes and their role in quality assurance and regulation in nursing homes.

### Outcomes

#### Rationale for using outcomes

Services provided by nursing homes can be viewed from three different perspectives as outlined by Donabedian (1966): structure, process, and outcome. Structure refers to a facility's capacity to provide high quality care. Examples of elements of structure are the professional background of nurses and aides, physical plant, and policies and procedures. Process refers to the manner in which care is delivered. Catheter care, restorative nursing techniques, skin care, and organized social activities are examples of process.



Outcomes, narrowly defined, are measures of change in health status attributed to antecedent care. Incidence measures, recovery or cure rates, mortality rates, and functional improvement or decline are important examples. Most researchers also include changes in care setting as outcomes (e.g., discharges to hospital or home).

Other measures often considered outcomes may be referred to as quality indicators. These measures are not typically measures of health status change but indicate with a high likelihood when substandard care is being provided. For example, if the prevalence of decubitus ulcers is high, this may indicate insufficient attention to skin care. If the catheterization rate is high, this may indicate insufficient concern for the risk of urinary tract infection, almost a certain consequence of catheterization, when less risky alternatives are available (Staskin, 1986; Warren, 1986). It may also reflect a concern for keeping the cost of care down, but at the expense of resident health (Hu, 1986).

Evaluation of the quality of nursing homes has historically been based on structural and process criteria. The traditional federal survey emphasized paper compliance focusing on review of policies and procedures and records. The new federal process, Patient Care and Services (PaCS), has become more resident centered. The surveyors focus more on the adequacy of the care plans and the assessment and reassessment of resident needs than they had in the traditional process. Much less attention is given to review of policies and procedures (Spector et al., 1987).

Increasingly it has been argued that outcome criteria should be used in quality assurance (Doessel and Marshall, 1985). Outcomes are recommended because they focus directly on health status measurement. However, some researchers emphasize the need for establishing a causal linkage between process or structural aspects of care and outcomes. This linkage would demonstrate that substandard outcomes are associated with something the provider did or failed to do. Without this linkage, outcomes provide a basis for a general screen without direct implications for quality assurance (Brook et al., 1977; Kessner and Kalk, 1973; Vladeck, 1988). The Institute of Medicine report (1986) advocated a survey process that uses outcomes to screen nursing homes to allow surveyors to concentrate efforts on facilities with apparent problems. The report did not recommend, however, a totally outcome-oriented process but one that also includes monitoring and establishment of standards for preventive aspects of quality, such as safety, cleanliness, and sanitary food practices.

Many advocate outcome approaches to quality assurance because the connection between structure or process and outcome has not been well established (Kurowski and Shaughnessy, 1983; Mitchell, 1978; Chakryn and Roos, 1979). Others argue that using unproven process criteria may result in inefficient care, as providers are encouraged to provide ineffective care at potentially high cost. Providing outcome standards may encourage approaches to processes of care that providers believe will work (although not necessarily scientifically proven) and discourage processes mechanically followed which are not expected to be effective. However, Donabedian (1988) cautions that it is difficult to separate effectiveness from efficiency because all interventions carry some risk and ineffective care uses valuable resources.

To some extent, the dearth of knowledge of the relative effectiveness of





alternative processes of care in nursing homes is due to the inadequate number of good randomized trials of alternative clinical procedures as well as social services in nursing homes. The alternative, non-randomized studies of services, usually are inconclusive due to confounding and selection bias. It is almost impossible to separate service utilization from patient characteristics in nonrandom studies in which sicker residents receive a different mix of services based on clinical judgement (McAuliffe, 1979).

### Measuring outcomes

#### What to measure?

The evaluation of the quality of a nursing home should relate to the goals of a nursing home as discussed above. Because there are a number of goals, some of which may be conflicting, a number of outcomes should be reviewed to gain a comprehensive picture of the nursing home. Ultimately the quality reviewer must determine to what extent any negative findings are the fault of the nursing home and constitute a breach of quality standards. To make these decisions the reviewer must have a concept of how the nursing home is capable of helping its residents and what constitutes good nursing home care. The following list represents some areas in which nursing homes can make an impact:

- Some functional and mental decline can be avoided or delayed and some residents can show improvements in these areas.
- Some behavioral problems can be prevented and successfully treated.
- For many residents incontinence can be controlled.
- The grooming of some residents can be improved.
- Some deaths can be delayed.
- Some hospitalizations can be avoided.
- Some residents can be discharged home instead of remaining in the nursing home, and others can be discharged home earlier.
- Some decubitus ulcers can be prevented and/or cured.
- Some contractures can be prevented.
- Some infections can be avoided.
- Some weight loss can be avoided.
- Some accidents can be avoided.
- Social activities can be designed to include many residents.
- Resident's civil rights can be protected.

By establishing areas that nursing homes care can make a potential impact on resident health and quality of life, a corresponding list of outcomes can be constructed.



## Evaluation of outcome measures

The quality of outcome measures can be judged in terms of validity (Does it measure what it is supposed to?), and reliability (Is the measure consistently implemented by different persons or by the same person at different times?). Reliability is of particular concern when the outcome measure is a measure of change based on two points of time (e.g., functional decline). If the reliability is low, much of the measured change may be measurement error. Associated with validity and reliability are the following desired characteristics that make outcome measures useful for quality assurance: sufficient variation in the measure, the selection of appropriate target populations with sufficient sample size, sufficient frequency of measurement, attribution to variations in structure and processes of care, and precise definitions and classification criteria.

### Sufficient variation

Many outcome measures have a clinical relevance, but because the measures do not vary significantly, they will not discriminate between homes that provide standard care and those that provide sub-standard care. For example, a measure that taps instrumental activities of daily living (Lawton, 1970) would be a poor choice for measuring functional change in a nursing home population because few residents in nursing homes will be able to perform these activities independently. Another obvious example of such a measure would be the number of persons walking a mile, since so few people would be able to perform the activity. Independence in activities of daily living is the measure most often used for nursing home residents. However, even this measure may not be adequate with nursing home populations who are either very independent or very dependent.

### Sufficient sample size

The outcome measure should be based on the eligible population. If the measure is functional improvement in the nursing home, for example, only those eligible to improve should be included; discharges, and those who already are at the highest level of functioning should be excluded. If the percentage of residents recovering from a decubitus ulcer is the outcome, for example, then only those with a decubitus ulcer are eligible. If first incidence of decubitus ulcers is being measured, then the eligible population is the number without an ulcer.

Some clinically based outcomes may not be sensitive to the underlying processes of care if in fact few residents are eligible (the denominator is too small) or too few experience the outcome (the numerator is too small). In the first case the measure is very volatile and can be affected by one or two residents. Consequently comparison of a volatile rate to a standard rate does not provide much assurance that a nursing home with a lower rate is likely to be providing substandard care. An example of an outcome of the first type is "proportion of residents with stage 3 or 4 decubitus ulcers whose ulcers heal."

In the second case, few persons experience the outcome, providing little room for variation in the outcome measure to discriminate between proper or improper care. Examples of the second type are "the proportion of residents who become bedfast during a nursing home stay", and "the proportion of





residents with large weight loss." Although certain outcomes may be too rare for facility-level analyses, some of these measures may be practical for analyses at the state level or by chains of nursing homes.

If the quality assurance system is based on a sample of residents, using measures that involve a small eligible population is a problem. If the sampling process is statistically based and there is concern for low type I and type II errors, the smaller the eligible sample the larger the proportion that needs to be sampled. With eligible samples under 10 cases, almost all residents would need to be sampled for typical type I and type II error rates. One consequence of basing a quality assurance evaluation on too small a sample is the frequency that care problems are missed. Because of the high cost of a comprehensive review of all residents, regulators need to decide what error can be tolerated and what minimum standard of care is allowed. However, it should be pointed out that sampling a higher percentage for some groups for a focused review of particular aspects of care is much less costly than increasing the overall sample for review of all aspects of care. (See Spector et al., 1988 for a more technical discussion of the sampling issues.)

#### Frequency of measures and length of period

The appropriate length of time to measure an outcome depends on the underlying biological process and the stability of the outcome measure over time. As is demonstrated in the "new admission cohort" analysis in Chapter 2 of this report, the probability of functional change, discharge to hospital, home or death varies greatly during the first three months but stabilizes afterwards. This would suggest that outcomes associated with discharge, death and functional change for residents in early months of stay should be measured more frequently. If panel data are used, the length of stay in the home should be a case-mix adjustment with perhaps three months and three or more months as the cut-off point.

#### Attribution

When using outcomes in a quality assurance system, it is necessary to link disparities in outcomes to differences in the care provided in nursing home. The attribution problem is difficult. The standard methodological approach to this problem is to identify the resident characteristics that influence the outcome and adjust the expected outcome for differences in the mix of residents at admission when comparing outcomes of facilities (Elandt-Johnson and Johnson, 1980). If data are not collected at admission but at differing points of stay as is the case with cross sectional data, it is not possible to account for unnecessary dysfunction attributable to prior substandard care, and consequently the case-mix adjustment is incomplete. Unless a complete model of the relationship between outcome and resident characteristics is developed from admission, outcomes will be under-adjusted, and some of the variation in outcomes attributable to differences in residents will be incorrectly attributed to facilities. Nevertheless, an imperfect adjustment should improve the efficiency of the screening process compared to a process that uses unadjusted outcomes (e.g., the New York Sentinel Health Events (SHEs) system) (Hamm, Kickham, and Cutler, 1983).

Another concern associated with the attribution problem relates to the impact of prior services or services provided by other organizations that are received during the nursing home stay or subsequently. (The concern is mainly





with hospitalizations). There are pros and cons to the best approach to take in each of these cases. The final decision depends on the particular situation and a number of factors, for example, the variation in quality of hospitals, whether the hospitalizations influences the particular outcome, and whether there are differential hospitalization rates across nursing homes.

Concerns about prior care may be dealt with partially by choosing the eligible population appropriately to eliminate the influence of the prior care. An example would be using an incidence measure for decubitus ulcers, (e.g., proportion of residents acquiring a new ulcer during the nursing home stay) instead of the proportion of all residents with a decubitus ulcer. This strategy eliminates from the measure ulcers formed in recent hospital stays. Another approach would be to use the total number of residents with sores but to adjust for the proportion of residents with a recent hospitalization. The second method would control for the average effect of the confounder (hospitalizations) but would not pick up the differential effect of substandard hospitals and would attribute the consequent substandard outcomes to the nursing home.

With respect to other care received during the nursing home stay, (e.g., a hospitalization and subsequent readmission to the nursing home) the question is whether to include the readmitted hospitalized residents in the outcome estimate. If hospitalizations do not affect the outcome then the hospitalized residents should be include in the estimate. Otherwise there is an incentive to ship out difficult residents to the hospital to look better on the quality indicator. However, if hospitalizations affect the outcome, then there is an attribution problem. The average influence can be adjusted for like any other case-mix variable. However, unknown differential quality in hospitals cannot be adjusted for, resulting in incorrect attribution of the substandard quality to some nursing homes.

A similar concern relates to an outcome that occurs subsequent to the nursing home stay. Again the best approach depends on the particular situation. This issue occurs mainly when death is used as an outcome. One approach is to measure outcomes only up to the point of discharge. Deaths that occur in the hospital within a few days after discharge are not included. A problem with this approach is differential discharge to hospital. If some homes discharge many resident to the hospital just before they die, this protocol will make them look good if the measure is the proportion of residents discharged dead. A possible solution to this complication would be to include all deaths that occurred in the hospital a short period of time after discharge (e.g., within two days). This approach would complicate the data collection procedures with the need for a separate follow-up for discharges to the hospital. A system of this type is being used by National Health Corporation in which all discharged residents are interviewed three months after discharge to track subsequent transitions including deaths.

Another approach would be to fix a follow-up time and collect deaths from death certificates. The advantage of this approach is that each resident is followed for the same period of time. Because deaths may occur subsequent to discharges there is an attribution problem with this approach. The resident who spends three days in the nursing home, goes to the hospital, and then dies prematurely after almost three months in the hospital can hardly be considered a "fault" of the nursing home. If the nursing home stay in general is a large proportion of the follow-up, the attribution problem may be minimal. However,



for a nursing home there may be a large number of residents who spend a short time in the nursing home and die three to six months later based on an unrelated episode. Consequently, the approach of following residents for a fixed time period, including time spent outside the facility, may be better advised for hospital outcomes than nursing home outcomes.

A limitation of approaches based on panel data is the inability to adjust for survival time and incorporate the timing to death. Two nursing homes may have the same number of deaths after adjusting for acuity but, the deaths in one may occur after less time in the nursing home. In this case it would be preferable to collect the precise dates of death to allow comparison of survival times.

### Definitions and classification criteria

To assure that outcome measures are reliable, careful attention must be given to definitions and classification rules. For example, if a measure of the change in eating ability is being constructed, the levels of different functioning ability must be determined and criteria must be developed to place a person into a unique category based on an assessment. The more cases that are classified based on professional judgement and not strict criteria, the less reliable the measure will be, although there will always be a need for judgement on gray areas. In addition, it may be necessary to establish other rules, for example, a time period for determining when the level of functioning is measured (e.g., last two weeks, 80 percent of the time), and a definition for what constitutes help (e.g. person help, but not mechanical help; disregard help cutting meat; include both supervision and hands-on help). To assure consistent definitions are being followed, assessors should be trained for reliability and assessments should be observed periodically to minimize deviations from definitions over time.

### Using validated scales

There are a number of scales that have been developed to measure health. Validated health scales provide a basis for consistently classifying residents to assess changes in the mix of residents in facilities. Measures of change in health status can be developed from these scales for use as outcomes by taking multiple measures over time.

Periodic assessments of nursing home residents often include validated scales. Sometimes, however, assessments rely mainly on professional judgement with insufficient concern for consistent judgement among assessors or over time. In order to provide a valid picture of the progress of residents, consistent and reliable measurement is necessary. The use of validated scales contributes to this goal.

There are a number of scales which are appropriate for the classification of nursing home residents and the development of outcome measures (Kane and Kane, 1981; Mangen and Peterson, 1982). The science of functional measurement is probably most refined with respect to physical function (Katz et al., 1963; Granger and Greer, 1976) followed by measures of memory and orientation (Kahn et al., 1960; Duke University, 1978; Folstein et al., 1975) and then followed by affective states (Beck et al., 1961; Zung, 1965) and behavioral problems (Cohen-Mansfield, 1986; Ryan et al., 1988).





There are a number of other areas where progress has been made to develop precise definitions. A few areas will be reviewed briefly below. With respect to continence, the measurement of urinary incontinence has been defined by the International Continence Society Committee for Standardization of Terminology, but operational definitions that classify the severity are not well developed and have not been thoroughly tested for reliability and validity (Bates et al., 1979; Mohide, 1986). One area in which different approaches to classification occur concerns catheterization. Some clinicians and researchers classify catheterization as part of incontinence while others distinguish between the independent use of a catheter and catheterization with personal help.

Progress has been made in the classification of pressure sores, providing the ability to classify residents by number and stages of pressure sores (Norton, McLaren and Exton-Smith, 1975; Shea, 1975). In other areas associated with skilled nursing care, measures of contractures (Granger, Seltzer and Fishbein, 1987), restraints, (Covert, Rodrigues, and Solomon, 1977) and urinary tract infection (Akhtar et al., 1972; Broklehurst et al., 1977) have been developed but precise classification systems have not been consistently applied. With respect to visual and hearing impairments, a significant literature exists concerning both clinical and functional measures. (Corbin et al., 1984; Gilhome-Herbst and Humphrey, 1980; Noble, 1978; Genesky, 1976; Trevarthen and Sperry, 1973; Leibowitz and Post, 1982).

### Case-Mix Adjustment

#### Development of case-mix adjusters

Residents may be classified into groups based on common characteristics in order to describe variation in mix. The development of case-mix classification systems have been motivated, at least in part, by a need to identify the variation in specified outcomes attributed to differences in the mix of residents or patients. In the nursing home reimbursement arena, a number of systems have been developed that classify residents based on similarities in staff-time needs. Two popular systems are known as Management Minutes and Resource Utilization Groups (RUG-I and II). The correlates of staff time needs that are used to directly classify residents are a combination of skilled services, functional abilities and medical problems (Foley et al., 1984; Fries and Cooney, 1985; Fries, 1988).

Similarly in the quality arena, residents may be classified into groups to identify the impact of resident mix on nursing home outcomes such as changes in clinical or functional status. Patient correlates of these outcomes include measures of health status. Because health is multidimensional, the classification system should include multiple measures of health resulting in a set of profiles of the different subgroups of the population. The strategy for developing profiles for nursing home residents is somewhat different than for other elders in other settings.

Classification by disease is common for acute care populations. Classification systems such as the International Classification of Diseases (ICD) and Diagnostic and Statistical Manual of Mental Disorders (DSM) systems aid in reliable classification of patients, however large variation in diagnostic coding practices remain. Recent work on severity of illness measurement (Knaus et al., 1986; Horn and Horn, 1986) and comorbidity scales (Charlson et al., 1987; Kaplan and Feinstein, 1974) have enabled researchers to



profile hospital patients by severity of illness, comorbidities, and complications (Dubois et al., 1987).

Due to the heterogeneous nature of the elderly with multiple chronic conditions and varying degrees of severity and patterns of complications, classification of elders by disease has been more difficult. Each aspect and combination of conditions may affect the course of deterioration. Multiple coexisting problems for the elderly often muddle the clinical picture, making accurate diagnosis difficult. For nursing home residents, the diagnoses of Alzheimer's disease and the group of diagnosis falling into the affective disorders category are often inconsistently diagnosed and typically underdiagnosed. In another example, decubitus ulcers are rarely listed as a diagnosis (Miller and Elliot, 1976).

A second concern with respect to using diagnoses for nursing home residents is the general lack of updating of diagnoses. A hip fracture diagnosis for a recent episode provides meaningful information about the vitality of a resident but a hip fracture diagnosis based on a prior episode that is currently clinically insignificant will confound case-mix adjustment. A third concern is that classification of diagnoses to primary or secondary for residents with multiple diagnoses has not been standardized. Which condition is classified as primary may reflect the background of the physician, reimbursement rules, and care setting among other factors. Consequently for long term care, the distinction between primary and secondary diagnoses is rarely valuable.

Early work on profiling elderly populations in the 1950's by the Commission on Chronic Illness (1957) developed a system that combined both disease and physical dysfunction measures. Later, Katz and colleagues used a system of classification that included primary diagnosis, chronic diseases, and a disability grade to measure outcome from stroke, fracture of the hip, and rheumatoid arthritis (Katz et al., 1966; Katz et al., 1967; Katz et al., 1968). Katz et al. (1968) describe this approach for use as a general classification system of chronically ill elderly populations.

In the 1970's, a number of efforts to develop standard definitions for consistent classification of elders across sites using multiple measures of health were attempted. U.S. National Committee on Vital and Health Statistics developed a standard classification system known as the Long Term Care Minimum Data Set (National Center for Health Statistics, 1980); Densen and his colleagues (1976) developed "A Classification System for Long Term Care." The Patient Appraisal and Care (PACE) system was developed for patient-care planning (Public Health Service, Office of Long-Term Care, 1976). These systems serve as a foundation for classification of residents in nursing homes and the development of patient profiles.

#### What are the case-mix adjusters for nursing homes?

For a hospital, the construct which is measured to adjust for case-mix is severity of illness. Because nursing home residents have multiple conditions, the construct is necessarily broader and can be referred to as "vitality". It includes physiological factors, but also psychosocial factors as well. Case-mix measures appropriate for nursing home residents are therefore direct and indirect measures of vitality.





Over the life course, a person's vitality is affected generally by the aging process as well as by disease processes. These affect cell viability, organ reserve and the effectiveness of the immune system (Exton-Smith, 1985). Recent hospitalization and disease history directly impact on the vitality of residents, although decline in vitality associated with a recent hospitalization may be transient. These impacts are moderated by genetic disposition and health behaviors. The major health behaviors affecting the nursing home cohort include cigarette smoking, alcohol use and aerobic exercise history (Kasl, 1986).

### Operationalizing vitality

Functional measures of the independent ability to carry out activities of daily living (ADL) provide an indirect measure of vitality. In addition to ADL, mental function, behavior problems and affective disorders tap other dimensions of vitality. Age and sex are also important direct and indirect indicators of vitality. Age can be used as a proxy for unmeasured frailty. Gender measures the well established differences in health behaviors of men and women (mainly associated with cigarette smoking), as well as the female genetic predisposition to longer life expectancy (Verbrugge, 1977). Direct measures of health behavior history would be valuable information to include, however, these measures are rarely included in the nursing home record.

With respect to measuring recent acute episode, a number of measures can be used. Measures of recent hospitalization include, for example, number of hospital days in last x months, hospitalized in last x months (yes/no), and prior setting. Length of stay is another measure that may reflect recency of admission from hospital or another major life event precipitating a nursing home admission.

With respect to diagnoses, primary diagnoses should not be singled out, but a number of diagnoses should be collected. One approach to diagnoses is to include those conditions that may affect the functioning of the major organ systems (e.g., cancer, chronic pulmonary disease (COPD), cerebrovascular accidents (CVA), ischemic heart disease, organic brain syndrome). To the extent that tests and comorbidity information are available, as discussed earlier, a more complex classification of diagnoses may be warranted to adjust for severity of illness or stage of disease.

In addition, the receipt of special services or treatments may be included as case-mix adjusters in an attempt to pick up unmeasured frailty associated with a recent acute condition. The final choice of case-mix adjusters will depend on the many factors that have been discussed above as well as the the data that are available.

### Adjustment: Specific or general?

Another issue that affects the approach to case-mix adjustment depends on the overall goal for case-mix adjustment. If the goal is to classify residents in a simple manner with one generalizable classification system, a common denominator set of adjusters can be developed. However, many case-mix adjusters may relate to individual outcomes uniquely. For example, knowing the resident has a catheter may be important for measures related to urinary tract infections but not to mortality. With one classification system, adjustments for individual outcomes will be incomplete, potentially reducing the efficiency of using some outcomes in screening for quality assurance. If the goal is to



adjust as completely as possible for each outcome, then a unique set of adjusters should be used for each outcome measure. However, there is likely to be a core of adjusters that are common to most outcomes.

### Implications

In this chapter a number of conceptual and methodological issues have been reviewed that are associated with outcome measurement and case-mix adjustment for nursing homes. Based on this review, it can be concluded that a cook book prescription to case-mix quality assurance is not available. Each system should incorporate the special characteristics of the nursing home population. However, it can be emphasized that attention should be given to setting clear goals, measuring a number of outcomes, and carefully defining each measure based on the many issues and concepts discussed in the chapter. Each State should proceed to develop norms and standards based on both their own data and national data.

As definitions and outcome measures become standardized and data collection systems more reliable, comparison of results across systems will become more meaningful. Improvements in data systems are being made. Brown University, through its Center for Gerontology and Health Care Research, is currently involved in the design, testing, and evaluation of the new national resident assessment system and data base for nursing home residents.

The development of sophisticated outcome-oriented case-mix adjusted quality assurance systems for nursing homes is a realistic goal. Providing a basis for efficient screening of nursing homes, limited resources can be focused on the nursing homes that appear to need the most scrutiny. As our knowledge of the link between processes of care and outcomes also increases, case-mix adjusted outcome screening will become an even more powerful tool.

### Structure for This Report

The chapters which follow describe the major analyses conducted for this project. While reading this report as a whole will provide the most comprehensive picture of the study, we recognize that that many readers will focus selectively on certain chapters. In writing the report we have therefore tried to provide sufficient detail within each chapter so that the chapters can be read individually. Although this does result in some redundancy, this approach was intended to provide greater understanding and make the findings more readily interpretable.

The next chapter presents analyses of the functional changes of nursing home residents from their admission to the facility through the first year of stay. The third chapter outlines the methods used to analyze outcomes from three cross-sectional populations of nursing home residents. Results of these analyses are presented in separate chapters for each population studied: National Health Corporation (Chapter 4), New York (Chapter 5), and Texas Medicaid (Chapter 6). These three data collection systems are compared in Chapter 7 followed by a comparison of the results from the three populations in Chapter 8. The report concludes with the application of statistical models developed using a research data base which predict functional change and death to the National Health Corporation and New York administrative data.





## CHAPTER 2

### PATTERNS OF FUNCTIONAL CHANGE AND DISCHARGE

Studies of nursing home outcomes have been completed by a small number of researchers. The studies have in general been limited to analyses of a discharge cohort (Lewis, Cretin, and Kane, 1985; National Center for Health Statistics, 1981; Weissert and Scanlon, 1985) or analysis of the outcomes following a cross sectional sample of residents in nursing homes for a fixed period of follow-up (Booth et al., 1983; Donaldson, Clayton, and Clarke, 1980; Linn, Gurel and Linn, 1977; Mitchell, 1978).

In discharge cohort studies most measures are available only at discharge. The 1985 National Nursing Home Study has added a few more variables measured at admission than the earlier 1977 study (Sekscenski, 1987). Lewis, Cretin, and Kane (1985) included many measures at admission obtained retrospectively from the record. Cross sectional samples undersample short stay residents and usually are limited to a fixed follow-up period without collection of measures of functional change over the entire period. Some studies, focusing on death, have collected time of death from death certificates and have been able to use survival analysis over a long follow-up period (Donaldson and Jagger, 1983; Goldfarb, 1969). An exception, Densen et al. (1976), following 1,534 discharges from the hospital who were admitted to nursing homes, used survival methods to estimate transition rates for physical functional change and discharge status as well as mortality. A few studies have reported the relationship between physical functional status and nursing home outcomes (Densen et al., 1976; Donaldson and Jagger, 1983; Linn, Gurel, and Linn, 1977; Mitchell, 1978; Weissert and Scanlon, 1985).

In general studies which have incorporated a number of outcomes have used select populations. For example, Densen et al. (1976) only included residents discharged from the hospital. Linn, Gurel, and Linn (1977) studied males discharged from a Veterans Administration Hospital.

The purpose of this study was to describe the changing relationship between outcomes (functional change and discharge destination) and functional status the longer residents remain in a nursing home. Because outcomes relate to resident characteristics other than physical function, we also estimated these transition probabilities stratified by selected dichotomous characteristics.

### Methods

#### Data

This study is based on analysis of data obtained from 48 nursing homes owned by the National Health Corporation (NHC). In the NHC data system, residents are assessed at admission, at a level of care change, discharge, and periodically during their stay in the nursing home. Periodic assessments for intermediate care residents and private pay residents are done quarterly; for skilled care residents, assessments are done monthly. In addition, an assessment is completed by a nurse following a death in the nursing home, based on nurse's recall of the period preceding death. At discharge, information on





discharge status is collected and date of discharge is recorded. Information collected includes socio-demographic characteristics, health and physical functioning status, and services ordered and administered.

From these data we constructed a cohort of 4,739 residents newly admitted during the year 1984. Residents were included in the cohort if their first record in 1984 was an admission record, if they were not admitted from a nursing home, and if they were not in the NHC data system in 1983.

The NHC system tends to be Medicare-oriented, with about 60 percent of new admissions covered by Medicare compared with about 18 percent for all admissions nationally (Sekscenski, 1987). The typical resident at admission had a mean age of 77, was female (65%), white (91%), and transferred to the nursing home from a hospital (85%). This typical resident was dependent in five activities of daily living (51%), chairfast (28%) or bedfast (13%).

### Analytical procedures

#### Classifying residents into functional states

The NHC data include measures of functioning in activities of daily living (ADL). For each ADL (bathing, dressing, toileting, transferring, and feeding) the residents are assessed as to whether they carry out that activity with no help, with help, or is unable to do the activity. In addition there are two measures of continence: bladder and bowel. These are coded with six categories: continent, occasionally continent, incontinent, indwelling catheter, external catheter, and ostomy.

From these measures a hierarchical functional scale was developed following the approach of Katz et al. (1963). Each of the trichotomous variables was transformed into a dichotomous variable by combining "help" with "unable to do", thus converting the variable to an independent-dependent dichotomy. Continence was defined as continent in both bowel and bladder. A seven level scale was constructed: independence in all six items; dependent in one ADL; dependent in bathing + 1; dependent in bathing, dressing + 1; dependent in bathing, dressing, toileting + 1; dependent in bathing, dressing, toileting, transferring +1, dependent in all six ADL, and other. The other category included only 53 cases (1.2%).

The final category of the scale, dependent in all six ADLs, was further split into two groups: those needing help in feeding and those unable to feed. This was done to reduce the proportion of residents in the most severe category. Moreover, exploratory analysis indicated that this split had external validity with respect to death; those unable to feed at admission were more likely to die during the nursing home stay compared to those feeding with help. In addition, because there were only a small number of residents in the first four categories, these were combined into one category (ADL1). The "other" category was also included in this group. Residents classified into the ADL1 category are essentially residents who are able to transfer from bed to chair.

The resulting five categories were used to represent functional states, providing the basis for developing estimates of the transition probabilities of changing state or being discharged either dead, to a hospital, other institution, or to home. At admission the frequency of residents classified in



each functional state varied, with approximately 10 percent in ADL1, 27 percent in ADL2, 21 percent in ADL3, 15 percent in ADL4 and 23 percent in ADL5.

#### Estimating transition probabilities

Probabilities of transition between the five functional states and four discharge states (death, hospital, home, other institution) were estimated for each of four quarters following admission. Estimates were based on calculations of the central decrement rates. In addition, separate rates were calculated for each of the first three months following admission. This involves estimating 45 transition probabilities for each time period. Estimates were based on data collected from the periodic, discharge, and level-of-care assessments. Because assessments on the death record relied on recall they were judged to be unreliable and were not used.

Although the date of assessment is known for all assessments, the exact time of the functional change is not known. Consequently, it was necessary to make a number of assumptions concerning when persons changed states in order to calculate the central decrement rates. When a functional level was recorded at a periodic assessment that indicated a change in function had occurred, it was assumed that the change occurred halfway between that assessment and the prior assessment. Although the periodic, level-of-care, and discharge assessments do not account for all functional changes, only changes in function that were noted in the record were included in the calculations. No assumptions were added to account for unmeasured changes. To illustrate, residents who were assessed on a periodic assessment as an ADL5 who were an ADL1 30 days prior, were assumed to have instantaneously changed from ADL1 to ADL5 at the end of day 15, spending 15 days as an ADL1 and 15 days as an ADL5.

For purposes of these analyses, a specific date for each change was required. It was assumed that functional changes that were recorded at level-of-care or discharge assessments occurred two days prior to the date of the assessment. This assumption was made to reflect the likelihood that the discharge or level-of-care change was associated with a recent functional change. In addition the calculation of the decrement rates allowed for persons experiencing more than one change during a single period: for example, a functional change and a discharge. To illustrate, if a person was assessed as an ADL4 on a periodic assessment and 16 days later was hospitalized and assessed on the discharge assessment as an ADL5, two days in ADL5 would be credited to the denominator of the ADL5 to hospital decrement rate; 14 days would be credited to the ADL4-ADL5 decrement rate.

Probabilities of transition were estimated using maximum likelihood methods assuming that the hazard rates (i.e., the force of decrement at instantaneous time) were constant within each time period but not necessarily across time periods (London, 1986; Bowers et al., 1984). Estimates were made using multiple decrement methods (Jordan, 1982). All discharge states as well as death were treated as absorbing states. Therefore, a person discharged to home or hospital was not included in estimates of subsequent periods even if she returned to the nursing home.





### Sample size for transition estimates

NHC nursing homes are Medicare-oriented and as a result many of the residents stay in the facility for only a short period of time. Since readmissions, even after brief periods of discharge, are not included in these analyses, the lengths of stay here underrepresent the total time spent in a nursing home. Of the 4,739 residents who entered NHC nursing homes in 1984 for the first time, only 56 percent (2,632) remained after the first month, compared with 38 percent (1,775) after the second month, 28 percent (1,329) after the third month, 17 percent (788) after the sixth month, 12 percent (580) after the ninth month, and 10 percent (462) after one year. Consequently, estimated probabilities are more precise for the earlier time periods than for the later periods. Approximate confidence bands for each estimated probability based on the multinomial distribution were calculated. The precision of the estimates varied as follows: for example, for the transition from ADL1 to ADL2 in the first quarter the point estimate is .131 and the 95 percent confidence interval ranges from .102 to .165; for quarter 4, the point estimate is .064 and the interval is .028 to .138.

### Aggregation of outcomes

Individual outcomes were combined to represent positive and negative outcomes. To do this it was assumed that discharge to other institutions or remaining in the same functional state were neutral results, although it was recognized that under certain circumstances either of these outcomes may be viewed positively or negatively. For residents remaining in the nursing home in a given period all transitions from functional state ADLi to state ADLj in which  $i > j$  (e.g., ADL2 to ADL1) were combined to represent functional improvement; all transitions in which  $i < j$  were combined to represent functional decline (e.g., ADL1 to ADL2).

Functional improvement and discharge home were aggregated to represent a positive outcome. Functional decline, discharge to a hospital, and discharge dead were merged to represent a negative outcome. Probabilities of individual outcomes were added to produce estimates of the probabilities of aggregated outcomes. Ratios of estimated probabilities were constructed to estimate the proportion of positive outcomes that were represented by functional improvement and the proportion of negative outcomes that were represented by functional decline.

### Stratified analysis

Because of the specialized nature of the sample and because patterns of transition probabilities may vary according to particular resident characteristics, such as age, gender, and marital status, analysis of the effect of demographic variables on transition probabilities was attempted. A global test of significance comparing multinomial distributions was carried out. Dichotomous variables were constructed for four variables measured at admission: gender, age (under 30 years of age vs. 30 and over), marital status (married [yes/no]), and Medicare-covered (yes/no).





To test significance, the likelihood ratio statistic

$$-2\ln(L_0/L_1)$$

0 1

was examined with  $L_0$  calculated based on the entire sample and  $L_1$  calculated using sub-groups defined by the dichotomous covariates and compared to

percentiles of the chi-square distribution with 45 degrees of freedom (see, for example, Mood, Graybill, and Boes, 1974). Each of the four covariates was tested for each of the time periods.

### Hypotheses

It was hypothesized that residents beginning a period with more dysfunction would have a higher likelihood of experiencing a negative outcome. It was further hypothesized that the longer a resident remained in the nursing home the less likely the resident would be discharged (controlling for functional level). Thirdly, it was hypothesized that for residents experiencing a positive or negative outcome, the more the dysfunction the more likely that the outcome would be the least desirable among the possibilities. In particular, among residents experiencing a positive outcome, residents with more dysfunction would be more likely to experience a functional improvement rather than a discharge home; and for residents experiencing a negative outcome, residents with less dysfunction would be more likely to experience a functional decline than a discharge to hospital or discharge dead.

### Results

#### Probability of remaining in the nursing home

Overall the longer residents remained in the nursing home, the more likely they were to remain in the nursing home (see Table 2-1). For example the probability of remaining in the nursing home in quarter 1 for ADL1 was .33 increasing to .68 in quarter 2, .79 in quarter 3 and .88 in quarter 4. Similar patterns were found for those in other ADL states. In general, those in ADL1 and ADL5 were least likely to remain in the nursing home in each quarter. This reflected the high likelihood that those in ADL1 were discharged home and those in ADL5 were discharged dead. Over the first quarter, monthly probabilities increased for each state following the same pattern as the quarterly probabilities.

#### Transition to discharge states

To summarize these patterns three figures illustrating the relationship between functional level at beginning of period and probabilities for discharged dead, to home, and to hospital are presented for each of the first four quarters and for the first three months of stay. Discharge to other institutions is not presented in a separate figure. Overall probabilities of discharge to other institutions were unrelated to ADL with about 6 percent transferring to other institutions in the first and second quarters, falling to under 3 percent in the final quarter.



### Discharge to home

The probability of being discharged home declined with length of stay in the facility. In addition the relationship with ADL level, a negative association, was strong early in the stay, but weakened for residents who remained in the nursing home, particularly for those remaining more than six months (Figure 2-1). For those residents with few dependencies (ADL1 and ADL2), the probability of discharge home during the first quarter of stay was substantial (.47 and .31, respectively). The probability declined greatly over the next three quarters (.15 and .17, respectively during the second quarter, .07 for both levels in the third quarter and .03 and .01, respectively in the fourth quarter). For those classified as ADL3, the probability was .15 in the first quarter, about 6 percentage points higher than those classified as ADL4. But in the subsequent quarters, the probabilities of discharge home for ADL3 and ADL4 were essentially equal. For those classified as ADL5, the probability was low throughout the stay declining slightly from .04 to .01 over the four quarters.

Looking at one month probabilities in the first quarter, revealed that one month probabilities remained stable except for the ADL1 group which showed a large decline over the three month period. The probability of discharge home was negatively related to functional level, with all five levels showing differences in the first month; but by month two, three groups remained: ADL1 and ADL2, ADL3 and ADL4, and ADL5 (see Figure 2-1).

### Discharge dead

Over the four quarters those with five or six dysfunctions showed significant declines in the probability of discharge dead (see Figure 2-2). Those in less dysfunctional states had low relatively stable probabilities. In the first quarter the positive relationship between ADL level and the probability of death was strong, varying from .30 for ADL5, to .10 for ADL4, to less than .01 for ADL1. But by the second quarter the main distinction was between ADL5 and the remaining states (.15 compared with .05 or less). By the fourth quarter only those in ADL5 had a substantial risk of discharge dead (.10 compared with .01 or less).

Looking at monthly probabilities in the first quarter, indicates that except for a decline in the probability of discharge dead for those in ADL5 between the first and second month, the probabilities were stable over the period. Over the three months, the probability of discharge death remained positively related to functional level with five distinct levels observed.

### Discharge to hospital

In general the probability of being hospitalized declined with length of stay in a nursing home (see Figure 2-3). A positive relationship between the probability of discharge and functional level was observed in the first quarter with those classified as ADL5 having a probability of .25 compared with .14 and .15, respectively for those in ADL3 and ADL4, and .11 for those in ADL1 and ADL2. By quarter 2 the main distinction was between ADL5 and all others states (a probability of .19 compared with probabilities ranging from .10 to .12). In quarter 3 the probability for ADL5 declined to .17 compared with probabilities in the range of a range of .07 to .12 for other ADL states. By the fourth quarter the relationship to ADL was very weak with those in ADL1 and ADL2





having slightly lower probabilities than those in ADL3-ADL5.

Looking at monthly probabilities over the first quarter indicates that the probability of hospitalization declined greatly for those classified as ADL5, ADL4 and ADL3, but remained low and relatively constant for those classified as ADL1 and ADL2. In general three patterns can be described, a pattern for ADL5, for ADL3 and ADL4, and for ADL1 and ADL2. For ADL5 the probabilities declined from .17 to .11 over the quarter compared with a decline from about .12 to .05 for ADL3 and ADL4, compared with a decline from .07 to .05 for ADL1 and ADL2.

#### Positive outcomes

Grouping discharge home and functional improvements into a category labeled good outcome, indicates that the probability of a good outcome declined the longer one remained in a nursing home (Table 2-2). This was the case in general for each ADL state. The decline was most dramatic for those in ADL1 and ADL2. For ADL1 the probability declined from .47 to .15 by quarter 2 to .03 by quarter 4. For ADL2 the probability declined from .55 to .39 by quarter 2 to .17 by quarter 4. The higher probabilities for ADL2 compared to ADL1 is counterintuitive, but can be explained by the inability to measure functional improvement for these resident who are in ADL1, the highest functional category of the scale, and remain in the nursing home.

During the first quarter, monthly probabilities declined for each ADL state. A weak relationship between ADL and the probability of a positive outcome was revealed, with the main differences being between ADL5 and the other ADL states, with those in ADL5 having much lower probabilities of a positive outcome (see Table 2-2).

When comparing probabilities by functional state (ADL2-ADL5) in quarter 1, in general more dysfunctional residents were less likely to have a positive outcome. The relationship did not hold for ADL1 for the reasons discussed above. A positive relationship was not found after the first quarter, however, with residents in ADL4 having the highest probabilities of a positive outcome in each of the final three quarters.

#### Proportion of positive outcomes represented by improvement

For residents experiencing a positive outcome, the ratio of the probability of an improvement to the probability of a positive outcome (discharge home plus improvement) increased the longer a person remained in the nursing home (see Table 2-3). For example for those in ADL2, the ratio of probabilities increased from .42 in quarter 1 to .57 in quarter 2 to .94 in quarter 4. Over the first three quarters the ratio increased with the amount of dysfunction. By the fourth quarter, because the chance of being discharged was so low for any state, no relationship with ADL was found. There was no clear pattern of increase in the ratio over the first three months.

#### Negative outcomes

Negative outcomes included functional decline for those remaining in the nursing home, discharge dead, and discharge to hospital. The probability of a negative outcome declined the longer one remained in a nursing home (see Table 2-4). For example, for the first quarter the probability increased with increased dysfunction except that ADL1 and ADL2 states had about the same





probability of having a negative outcome. The pattern continued for the following three quarters except for the ADL5 state. Lower probabilities in this state can partially be attributed to the inability to measure functional decline because ADL5 was the most severe state. This group could only experience two negative outcomes: discharge dead and discharge to the hospital. The probabilities for both these outcomes declined drastically after quarter 1 for those in ADL5.

During the first quarter, monthly probabilities declined, for example for ADL1 from .193 in month 1 to .164 in month 2 to .145 in month 3. The probability of a negative outcome was positively related to the amount of dysfunction in month 1, but the relationship weakened in month 2 and 3.

#### The proportion of negative outcomes represented by decline

Because the probabilities of discharge dead and to hospital declined somewhat over the four quarters, especially for ADL3-ADL5, the ratio of the probability of decline to the probability of negative outcomes increased, except for ADL1, in which it remained stable over the four quarters (see Table 2-5). Overall, declines represented about half of the negative outcomes in quarter 1, increasing to about two-thirds by quarter 4. In quarter 1, the ratio was negatively related to dysfunction, as hypothesized. However the relationship weakened in the second quarter and disappeared by quarter 3. The monthly ratios in the first quarter remained fairly stable.

#### Stratified analysis

Results of the analyses of subgroups indicate that Medicare-covered residents have a different pattern of functional change and discharge than residents not covered by Medicare at admission. Transition rates were significantly different for all periods up to six months after admission. Different patterns were found for gender, marital status and age, but the main differences were found in the first month of stay, and in general differences were not important (see Table 2-6). When the period was extended to 90-day intervals (quarters 2-4), differences were found in the second quarter for age at the .05 level with marital status and gender significant at the .06 level. Gender was significant in the third quarter at the .02 level. The magnitude of these differences are discussed below and major differences are highlighted. Detailed tables are not presented.

##### Gender and age

In the first month, males classified in the ADL1 state were more likely to be discharged home than females in that state (.40 compared with .25, respectively). Although significant differences were found in quarter 4 by gender, differences were minor. With respect to age, although significant differences were found at the .01 level in month 1 and the .05 level in quarter 2, differences were minor.

##### Medicare-covered residents

The major difference between the outcomes of Medicare-covered and non-Medicare-covered residents was observed with respect to transition probabilities for discharge to home and discharge dead. The largest differences as expected were in the first month. The differences were not



universally found across all functional states, however. In month 1 for those in ADL1 the probability of discharge home for Medicare-covered residents was .56 compared with .21 for residents not covered by Medicare. For those categorized as ADL2, the probability of discharge home for Medicare-covered residents was .22 compared with .13 for residents not covered by Medicare. For residents categorized as ADL5, Medicare-covered residents had a probability of discharge dead of .25 compared with .14 for residents not covered by Medicare. Similar results are found for up to six months after admission, although the relationship of Medicare coverage with discharge dead decreased with length of stay.

### Married

The main difference in the outcome patterns of married versus unmarried residents was in discharge home. Married residents in ADL states 2-5 were more likely to be discharged home (.23 vs. .17 for ADL2, .15 vs. .08 for ADL3, .08 vs. .05 for ADL4, and .04 vs. .02 for ADL5). A similar result was found in month 3 and in quarter 2.

### Discussion

This chapter presented the changing pattern of functional status and the changing risk of discharge dead, to home, and hospital. Analyses showed that early in the nursing home stay the likelihood of a positive outcome is strongly related to the functional abilities of residents, but the longer residents remain in a nursing home the less likely they will leave the nursing home for any reason. By the ninth month few residents are discharged home or to another institution other than a hospital. Although the NHC sample is heavily weighted to Medicare-covered residents at admission, the overall pattern is the same. The main difference between Medicare and non-Medicare covered residents is the higher likelihood that residents with few dysfunctions will be discharged home in the first six months in the nursing home, but particularly in the first month. Also among very dysfunctional residents in the early months, Medicare-covered residents were more likely to be discharge dead. These findings are consistent with other studies of length of stay and discharge status (Weissert and Scanlon, 1985; Keeler, Kane and Solomon, 1981). Results with respect to age, marital status, and functional level were consistent with the findings of Weissert and Scanlon (1978).

The study confirms the notion that elders who enter nursing homes and stay for six or more months are very unlikely to return home. These data indicate that "the point of no return" is approximately nine months rather than six months, however. For many residents, particularly those with few functional deficits, nevertheless, the prospects of having a short stay in the nursing home and returning home are about 1 in 3 in the first month and 1 in 4 the second month for those who are mobile (able to transfer).

This study confirms the importance of defining subgroups of residents especially by functional abilities when discussing outcomes. The large differences in the pattern of change for those who were able to feed with help (ADL4) compared to those unable to feed (ADL5) should be emphasized, particularly with respect to discharge dead, discharge to hospital, and positive outcomes. This has important implications for making case-mix adjustments for quality outcome indicators.







The study also indicates that discharge home may not be valid for quality assurance purposes for residents who have been in the nursing home for six months or more because so few residents are likely to be discharged home. The study also indicates that a three level ADL adjustment for case-mix may be sufficient for outcomes such as discharge status and functional change.



Table 2-1

Probabilities of remaining in a nursing home, by functional state and time period, NHC new admission cohort, 1984

<u>Functional State</u>	<u>Month</u>			
	<u>1</u>	<u>2</u>	<u>3</u>	
ADL 1	.531	.636	.765	
ADL 2	.679	.687	.743	
ADL 3	.696	.762	.823	
ADL 4	.700	.754	.813	
ADL 5	.541	.709	.744	

	<u>Quarter</u>			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
ADL 1	.326	.676	.792	.883
ADL 2	.489	.653	.767	.903
ADL 3	.580	.722	.778	.865
ADL 4	.589	.734	.840	.889
ADL 5	.355	.572	.692	.770



Table 2-2

Probabilities of a positive outcome, by functional state and time period, NHC  
new admission cohort, 1984

<u>Functional State</u>	<u>Month</u>		
	<u>1</u>	<u>2</u>	<u>3</u>
ADL 1	.348	.244	.136
ADL 2	.320	.377	.268
ADL 3	.334	.304	.206
ADL 4	.308	.277	.262
ADL 5	.191	.165	.116

	<u>Quarter</u>			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
ADL 1	.469	.152	.068	.027
ADL 2	.546	.389	.215	.174
ADL 3	.484	.296	.197	.120
ADL 4	.451	.425	.228	.234
ADL 5	.291	.176	.139	.121





Table 2-3

Ratio of probability of improvement to probability of positive outcome, by functional state and time period, NHC new admission cohort, 1984

<u>Functional State</u>	<u>Month</u>		
	<u>1</u>	<u>2</u>	<u>3</u>
ADL 1	---	---	---
ADL 2	.418	.424	.454
ADL 3	.688	.711	.686
ADL 4	.808	.780	.800
ADL 5	.859	.849	.878

	<u>Quarter</u>			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
ADL 1	---	---	---	---
ADL 2	.425	.570	.656	.943
ADL 3	.694	.748	.775	.938
ADL 4	.800	.849	.778	1.000
ADL 5	.859	.845	.964	.947



Table 2-4

Probabilities of a negative outcome, by functional state and time period, NHC  
new admission cohort, 1984

<u>Functional State</u>	<u>Month</u>			
	<u>1</u>	<u>2</u>	<u>3</u>	
ADL 1	.193	.164	.145	
ADL 2	.193	.161	.161	
ADL 3	.286	.205	.144	
ADL 4	.336	.199	.180	
ADL 5	.395	.238	.221	

	<u>Quarter</u>			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
ADL 1	.305	.304	.271	.207
ADL 2	.295	.290	.289	.193
ADL 3	.380	.376	.360	.316
ADL 4	.420	.339	.371	.332
ADL 5	.550	.337	.254	.204





Table 2-5

Ratio of the probability of decline to probability of negative outcome, by  
functional state and time period, NHC new admission cohort, 1984

<u>Functional State</u>	<u>Month</u>		
	<u>1</u>	<u>2</u>	<u>3</u>
ADL 1	.642	.621	.611
ADL 2	.518	.556	.564
ADL 3	.434	.489	.451
ADL 4	.427	.329	.459
ADL 5	---	---	---

	<u>Quarter</u>			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
ADL 1	.629	.611	.578	.616
ADL 2	.550	.604	.617	.650
ADL 3	.449	.603	.562	.643
ADL 4	.404	.544	.795	.704
ADL 5	---	---	---	---



Table 2-6

Likelihood ratio statistics and p-values for age (under 80 or 80 and over), gender, medicare coverage, and marital status (married or unmarried), NHC new admission cohort, 1984

<u>Time Period</u> <u>(days)</u>	<u>Age</u>	<u>Gender</u>	<u>Medicare</u> <u>Coverage</u>	<u>Marital</u> <u>Status</u>
0 - 30	73.12 (.0051)	81.76 (.0007)	247.08 (.0000)	73.14 (.0050)
31 - 60	46.70 (.4024)	51.08 (.2471)	169.96 (.0000)	41.24 (.6320)
61 - 90	49.32 (.3045)	42.64 (.5724)	114.34 (.0000)	68.94 (.0124)
91 - 180	62.48 (.0432)	60.84 (.0577)	104.42 (.0000)	61.50 (.0514)
181 - 270	55.52 (.1353)	68.02 (.0149)	59.65 (.0706)	45.79 (.4392)
271 - 360	54.48 (.1572)	38.63 (.7372)	36.30 (.8192)	47.53 (.3700)



Figure 2-1

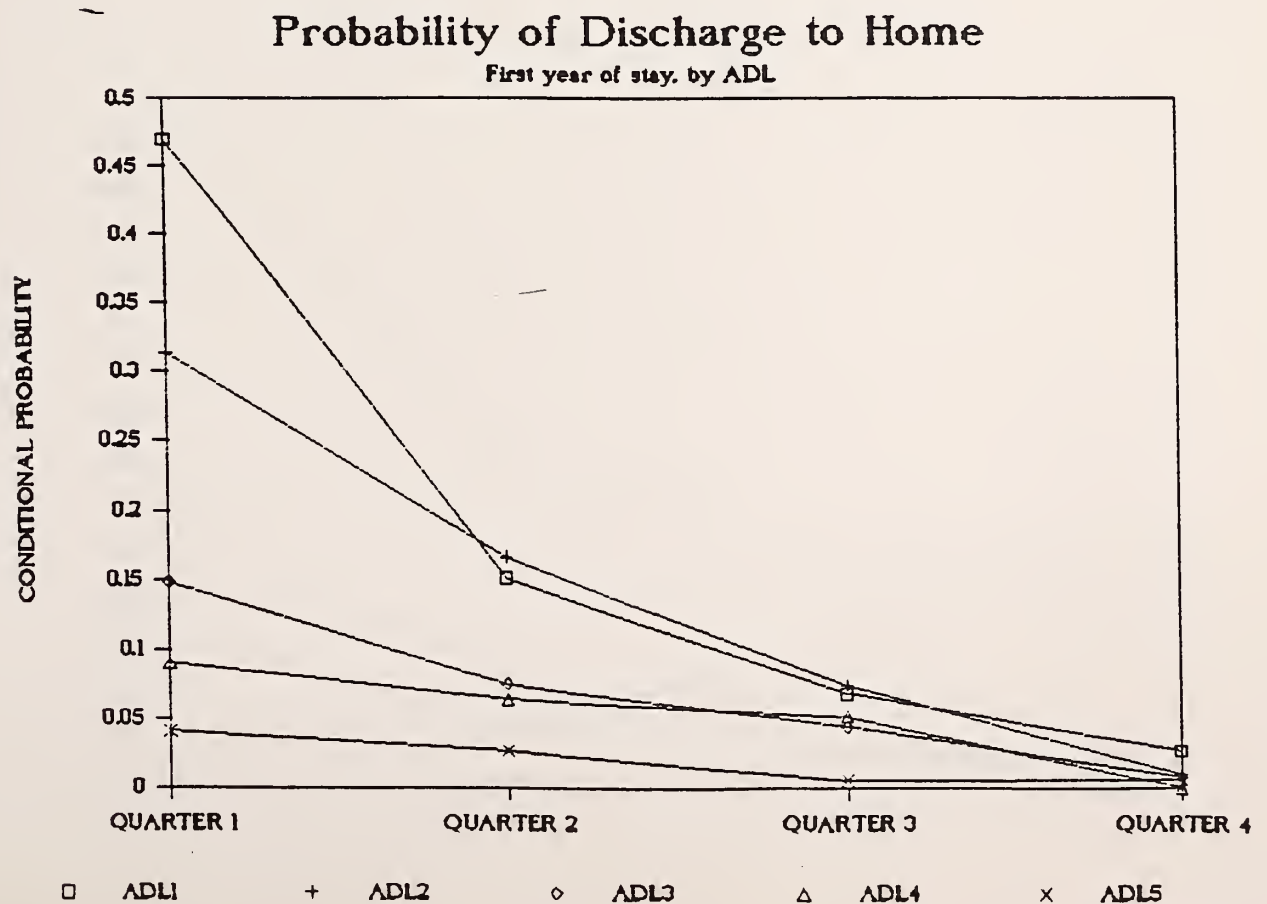
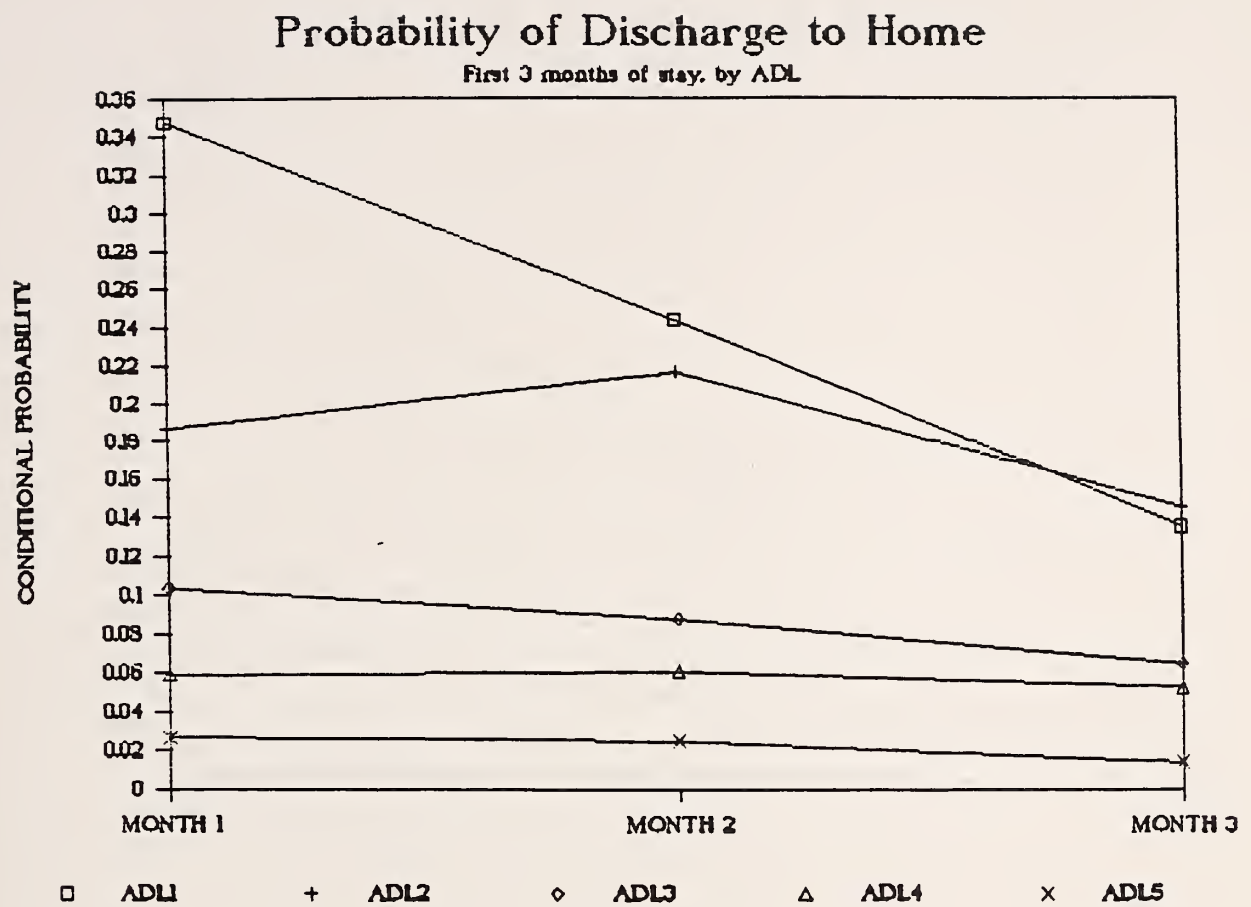


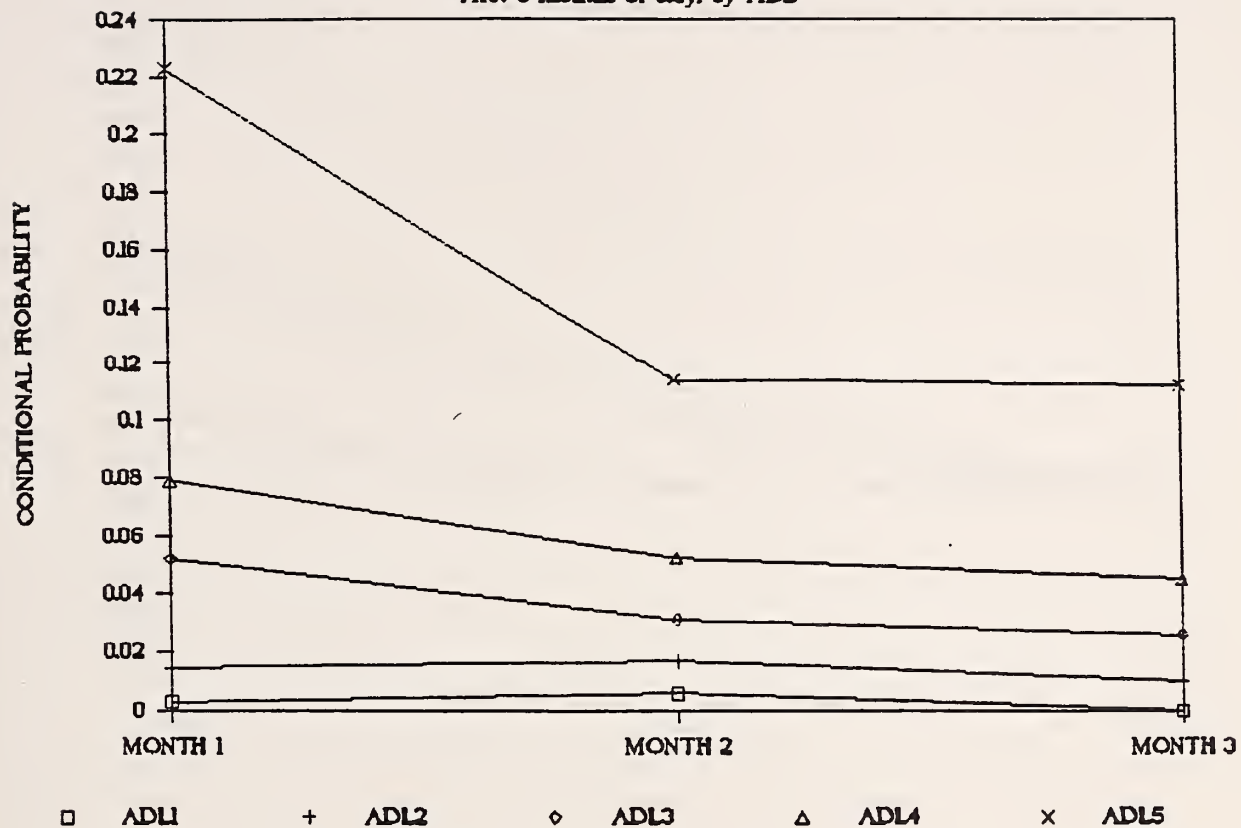




Figure 2-2

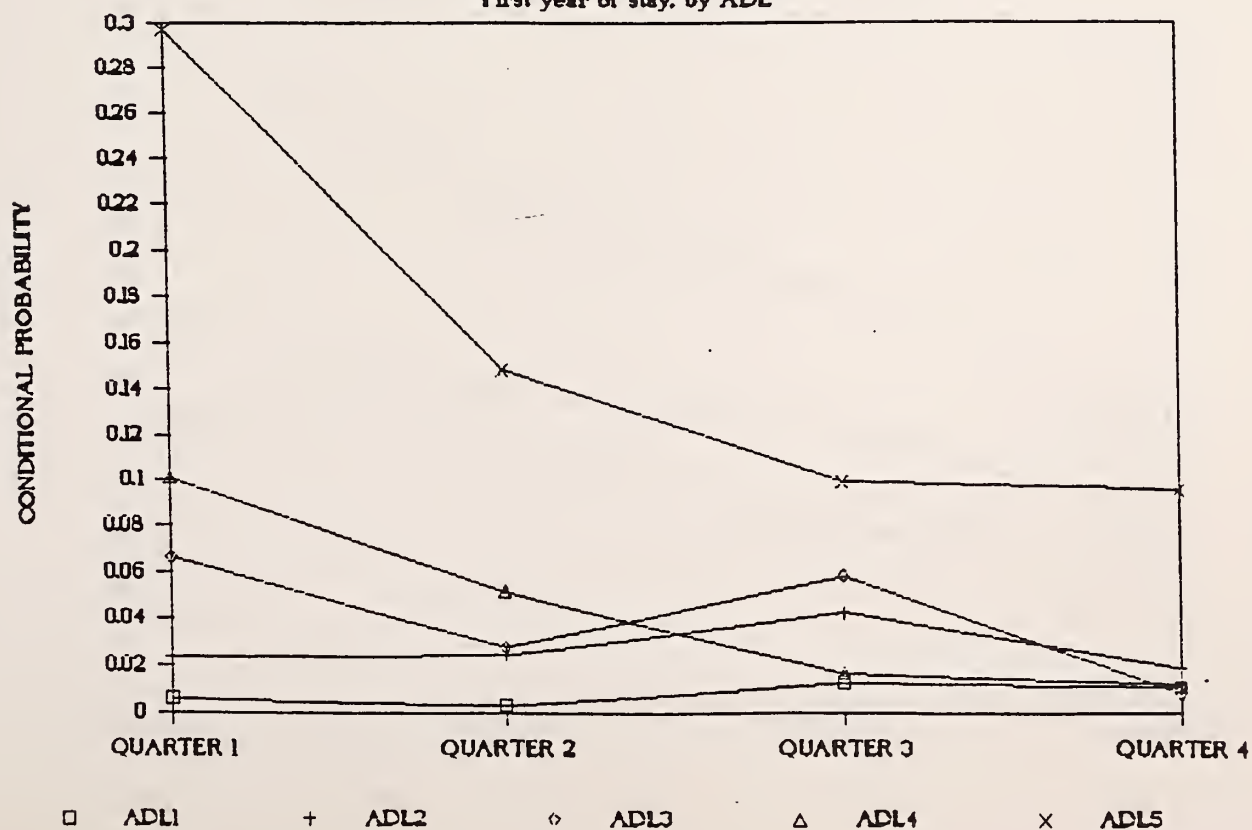
## Probability of Discharge Dead

First 3 months of stay, by ADL



## Probability of Discharge Dead

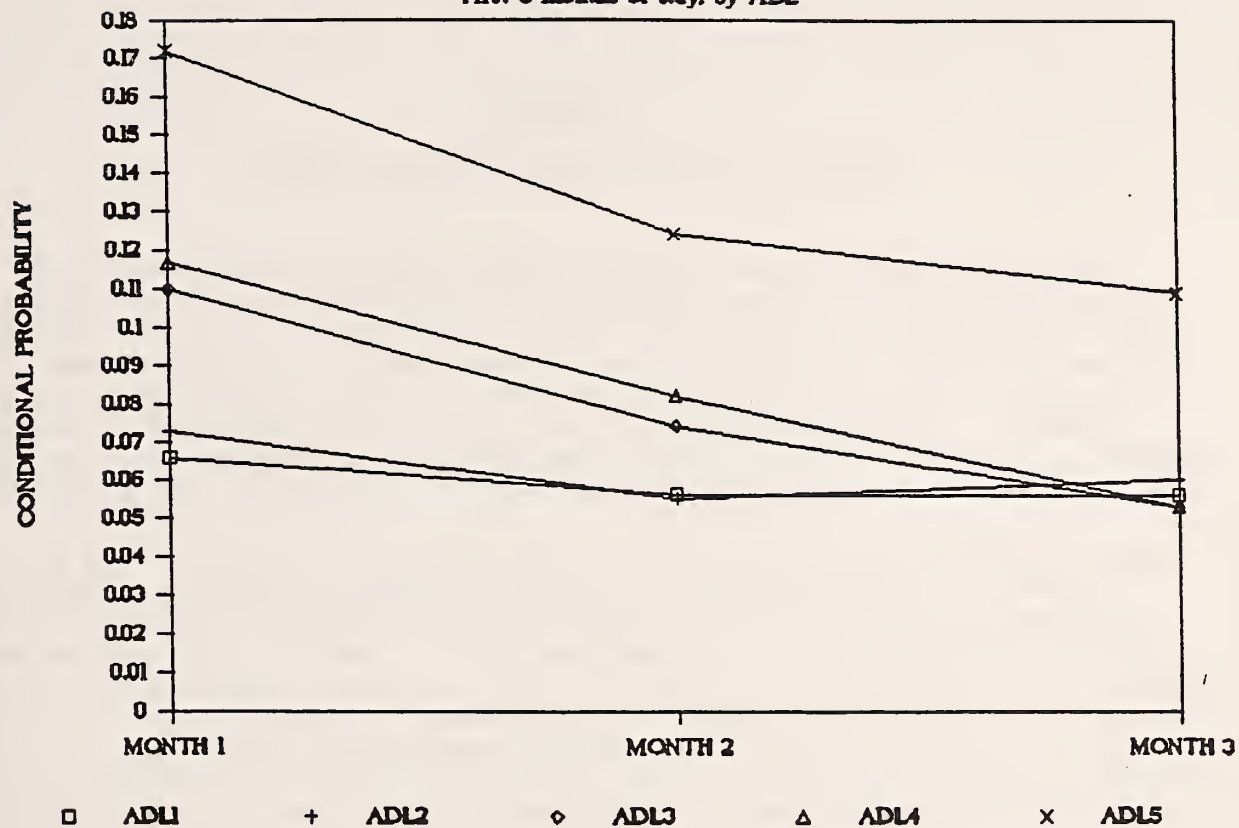
First year of stay, by ADL





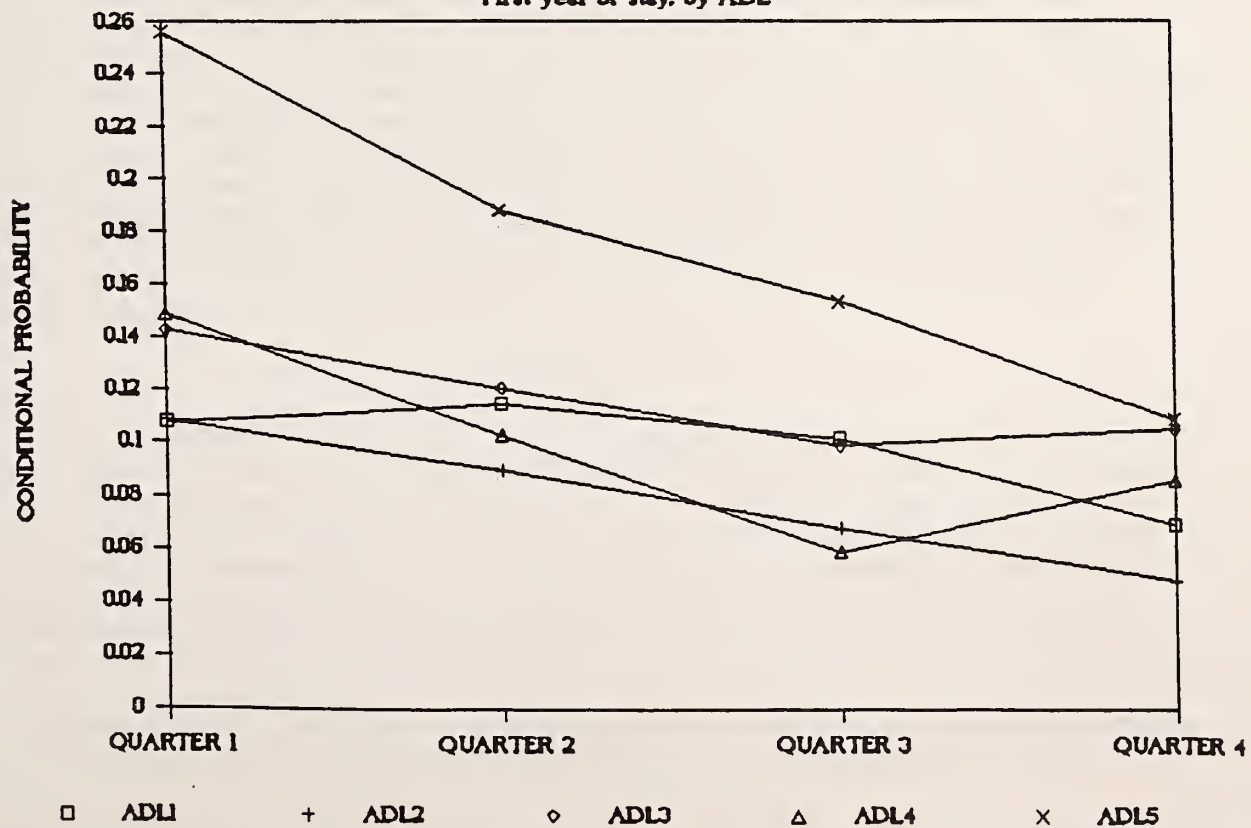
# Probability of Discharge to Hospital

First 3 months of stay, by ADL



# Probability of Discharge to Hospital

First year of stay, by ADL







## CHAPTER 3

### METHODS FOR LONGITUDINAL OUTCOME ANALYSIS

This chapter describes the general approach used in the comparative analyses of longitudinal resident outcomes which were performed on the three major data sets used in this study: data from the National Health Corporation (NHC), New York State's Patient Review Instrument (PRI), and Medicaid residents in Texas nursing homes. Specific methods and results from each of these analyses are contained in the next three chapters (Chapters 4-6). Chapter 7 contains a cross-comparison of these three data collection systems, and Chapter 8 highlights a comparison of results across the data sets.

Our goal in performing these analyses was to look at outcomes of nursing home stays, including indicators of clinical care and changes in function. Factors thought to be related to these outcomes of interest were examined as potential case-mix adjusters. These analyses were performed using panels of nursing home residents, that is, data sets based on a cross-sectional sample of residents in the facility at fixed points in time, with subsequent assessments made at a later time on these same residents. For these analyses, we used data from three different sources and populations, to determine whether the results obtained in one data set would be consistent with results obtained using a different data collection instrument and a different population.

#### Consensus meeting

Since there are many possible outcome measures, there may not be a unique set of resident characteristics that correlates with all outcomes. The strategy used in this project was to study correlates of clinically based quality indicators. It was not the goal of this project to develop a single patient classification system. Specific plans for these analyses were outlined in a consensus-development meeting held at Brown University in January 1988. Those attending were: Elizabeth Cornelius (HCFA Project Officer), William Foley (Rensselaer Polytechnic Institute, then on a fellowship at HCFA), John Morris (Hebrew Rehabilitation Center for Aged), and from Brown University: William Spector (Principal Investigator), Vincent Mor (Director, Center for Gerontology and Health Care Research), Mary Kapp (Project Director), and Ann Eichorn (Project Analyst).

#### The Data

Of the data sets available to us, it was agreed that each could make a distinct contribution and, where practical, each should be used to its fullest extent. This was preferable to limiting the analyses to those items which could be identified as common to all data sets or rescaling items to achieve similar coding schemes; each of these alternatives would mean the loss of a considerable amount of information. This decision was reached, despite the acknowledgment that the analyses performed on each of the data sets would not be completely comparable to one another.

Of the four data sets initially obtained for use in this study (New York-PRI, Texas-Medicaid, National Health Corporation, and Hillhaven), it was



decided that analyses would proceed on three: New York, Texas, and NHC. Although progress had been made with the Hillhaven data, it was decided not include these data in this set of analyses because of the lack of comparability of the data and the amount of time needed to create a working analytic file.

### Time frame

The analyses utilized samples of residents which contained a Time 1 assessment based on a cross-section of residents, and a Time 2 set of follow-up assessments for residents who were still in the facility approximately six months later. Time 1 assessments are also included for residents who were no longer in the facility at Time 2, that is, residents who had died or been discharged during the follow-up period.

Specific calendar time for the data collected varied from one data set to another. We chose to maximize the number of residents to be included in analyses, yet not to go beyond two years of data for any given data set. Where possible, we used the most current data available yet tried to make the years of the study overlap across the three files as much as possible.

### Sampling

The sample of residents to be included in each data set was drawn from a facility-level sample. In other words, a random sample of facilities (or, in the case of NHC, all facilities) was selected for inclusion in the analyses and all residents from those facilities who had records in the master file were included in the analytic file. Facilities included were skilled care, intermediate care, and dual certified facilities; however, any facility which we knew or suspected was ICF-MR was excluded.

### Selection of outcome measures

Outcome measures used include measures of physical functioning, clinical measures and service-related indicators. Definitions for the items chosen vary across the data collection instruments. For practical reasons, we were limited to the items and coding schemes available to us from existing administrative data bases. The follow-up period for the examination of outcomes was approximately six months; this six month time frame provides a comparable time interval for each of the data sets analyzed.

The following variables were used as outcomes: feeding, transferring, mobility, toileting, continence, contractures, decubitus ulcers, urinary tract infections, bladder and bowel training, and restraints. Independent variables were chosen specifically for each outcome. A chart showing the comparisons performed is presented in Figure 3-1.

The following discussion briefly highlights the rationale for the analyses which were performed. Chapter 1 provides a broader presentation of the rationale for including these measures as outcomes. In addition, there are a number of geriatric medicine and nursing texts that discuss each of the outcomes in these analyses in greater detail.

### Measures of function

A resident's level of functional competency or impairment had been widely





recognized as a vital aspect of measurement of the resident's status and need for assistance. A number of scales have been used to determine the relationships between basic functional activities and the variation in experiences of improvement and decline in functional ability. Most include at least some of the activities of daily living (ADL) first outlined by Katz et al. in 1963 (Katz, 1963). Of these six activities - bathing, dressing, toileting, transfer, continence, and feeding - four were chosen as outcome measures in these analyses: feeding, transfer, toileting and continence.

Mobility was also included in these analyses. Immobility is widely recognized as a problem among nursing home residents and may be related to emotional and physical decline. A resident's actual ability to move from place to place (with or without a wheelchair), as distinct from the ability to transfer from bed to chair or from standing to sitting, is an important aspect of that individual's functional status.

The independent variables investigated as potential case-mix adjusters with respect to these functional measures were those which were hypothesized to alter a resident's ability to perform each of the activities. For feeding: stroke or plegia, mental status, age, and diabetes were examined. For transferring: hip fracture, stroke or plegia, congestive heart disease, mental status, and age were investigated. Potential adjusters for mobility were hip fracture, stroke or plegia, congestive heart disease, mental status, and age. Finally, factors examined in relation to toileting and continence were hip fracture, stroke or plegia, coma, diabetes, mental status, age, ADL summary score, and sex. In addition, the RUG-II grouping of "clinically complex" residents was also used as a stratifying variable for each of these measures of function.

### Clinical outcomes

Contractures can result from the abnormal shortening and stiffening of muscle tissue. The prevalence and incidence of contractures are useful as negative indicators of quality of care because they are, to some degree, preventable. Movement of the limbs of an immobile resident, in combination with massage and physical therapy, when appropriate, can prevent or limit the extent of contractures. Comprehensive care of immobile residents, especially those recovering from hip fracture or stroke, involves the prevention of contractures as well as other secondary complications (Granger, Seltzer, and Fishbein, 1987).

The potential case-mix adjusters examined in combination with contractures are related to the effects of decreased mobility. These are hip fracture, stroke or plegia, comatose, clinically complex condition, age, and ADL summary score. Tables showing the presence of contractures at Times 1 and 2 by each of the RUG-II categories are included in the Appendix.

Decubitus ulcers are common among persons confined to bed or to wheelchair. Circulatory insufficiency, neurologic deficits, and loss of subcutaneous fat make the elderly additionally susceptible (Rowe & Besdine, 1982). Prevention of decubiti is much simpler than their cure and involves frequent movement of the resident and the maintenance of clean, dry, healthy skin. The development of protocols for the identification and measurement of decubitus ulcers aids in their use as negative indicators of quality care (IOM, 1986).





Resident characteristics related to the development of decubitus ulcers can be separated into two groups. The first are related to the relationship between immobility and decubitus ulcers. These are hip fracture, stroke or plegia, coma, and ADL. The second are related to physiologic changes which result in greater skin susceptibility. These are the loss of sensation and compromised circulation which accompany diabetes, congestive heart failure, and increased age (Steffl, 1984). In addition the RUG-II clinically complex category was tested for its relationship with rates of decubitus ulcer. Tables for change in decubitus ulcers by each of the RUG-II categories are also contained in the Appendix.

Urinary tract infections are more prevalent in the elderly than in younger persons and are particularly common amongst elderly residents of long-term care facilities (Rowe & Besdine, 1982). Women are generally at greater risk than men, but the relative prevalence increases among older men with prostatic hypertrophy (Steffl, 1984). The overall prevalence increases with age. The prevalence and incidence of urinary tract infections are useful as negative indicators of quality of care in that many are preventable and those that do occur are often treatable with antibiotics and increased fluid intake.

Among the risk factors for the development of UTI are diabetes, dementia, cerebrovascular disease, decreased physical activity, poor hygiene, bladder outlet obstruction, and decreased immune competence. In addition, most patients with transurethral bladder catheters have bacteria present in their urine (Rowe & Besdine, 1982). Potential case-mix adjusters with respect to UTI examined in these analyses were those related to decreased physical activity (hip fracture, stroke/plegia, comatose, summary ADL measure), diabetes, age, use of urinary catheters, and sex. The Appendix provides tables of the presence of urinary tract infections by each of the RUG-II categories.

#### Service-related indicators

Bowel and bladder training are used to regain optimal bowel and/or bladder function and to re-establish patterns of performance of these activities which have been lost. Bladder and bowel control problems are common among the elderly and may be exacerbated by a decrease in mobility and activity accompanying institutionalization (Steffl, 1984). Training programs can improve muscular control and increase the resident's sensitivity to the needs to void and urinate, consequently improving the individual's degree of continence. The rehabilitation program is ideally tailored to the needs of the individual residents, and is usually of short duration.

Factors examined in relation to bowel and bladder training are related to decrease in activity and mobility (hip fracture, stroke/plegia, 3-level ADL), age, and mental status, which might affect an individual's need for rehabilitation and ability to respond.

Restraints, used unnecessarily and excessively are perhaps the most stereotypical indicators of low-quality institutional care. Restraints may be physical or chemical and may be used to prevent a confused resident from wandering, to keep a chairfast resident from sliding or falling from the chair, or to keep a resident prone in bed. It may be appropriate to restrain those residents who are confused, for their safety and that of those around them (IOM, 1986). The use of restraints is frequently justified, but often they can be



used to facilitate management of the institution's floor or ward (Steffl, 1984).

The items examined as potentially important case-mix indicators with respect to the use of restraints are the following: hip fracture, diabetes, mental status, age, and ADL. Residents recovering from a hip fracture require the maintenance of proper body alignment, preventing the rotation of the leg and hip, but it is important that these residents receive proper exercise and mobilization treatments (Steffl, 1984). Excessive immobility in hip fracture patients can result in incontinence, mental deterioration, and pneumonia. Individuals with diabetes are particularly susceptible to impairments in circulation, which requires the protection of their skin from trauma and infection (Rowe and Besdine, 1982). Physical restraints may consequently be inappropriate for these residents. Age and ADL level may also be related to an individual's need for protective or supportive restraints. In addition, the use of restraints by RUG-II groups is presented in the Appendix.

#### Variables ruled out for use

In addition to the items included in the analyses which were performed, several other variables were initially considered for inclusion as outcome measures and/or as potential case-mix adjusters. Despite their clinical merits and availability in the data bases, certain conditions and services were eliminated from consideration in these analyses because of their rare occurrence. Rare occurrences would not make practical outcome or stratifying variables.

Each of the following conditions or treatments were felt to be too rare to be examined specifically. Using baseline data from our sample of residents in nursing homes in New York, the following items were ruled out for specific use: dehydration (1.1%), internal bleeding (.6%), stasis ulcer (1.3%), terminally ill (1.0%), tracheostomy care/suctioning (.4%), suctioning-general (.2%), oxygen (.3%), respiratory care (.3%), nasal gastric feeding (2.2%), parenteral feeding (.4%), wound care (1.8%), chemotherapy (.3%), transfusion (.3%), and dialysis (.1%). Although these items were not explored further as separate entities, many of them are included in the RUG-II clinically complex category which is discussed below.

#### Independent variable construction

In general, each item included as a variable in the analyses was readily available from the data collection instrument. Age was grouped into three categories for analyses; these were under 65 years of age, 65-89 years of age, and 90 years of age or over. These age groups enable contrasting the extremes of the age spectrum found in nursing homes with the majority of residents included in the 65-89 age range. The clinically complex measure is one of the RUG-II categories; this group includes residents without severe behavioral problems who have the following treatments, diagnoses, or conditions: physician care one or more times a week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia. Specific definitions for all other variables and any recodings performed are described in greater detail in the chapter which corresponds to the particular data set. The general approach used for diagnoses and ADL are described below.







### Diagnosis codes

Diagnoses used in these analyses were obtained first from specific items on the data collection form which pertained to the diagnosis. If such an item were not available, presence of the diagnosis was determined by scanning the listing of all ICD-9 diagnosis codes recorded for the resident. In the New York data set, only a primary diagnosis code is recorded; however in NHC and Texas, up to nine or five diagnoses, respectively, are recorded. ICD-9 codes used were as follows:

Contractures	718.4 through 718.49
Urinary tract infections	599.0
Hip fracture	820 through 820.99
Stroke/plegia	436 through 436.99, and 342 through 344.99
Diabetes	250 through 250.91
Congestive heart failure	428 through 428.99

### Summary ADL

The three-level ADL score was computed from the transfer and feeding items. This measure was chosen as a summary measure of ADL that could be constructed in a reasonably comparable way in each of these data sets. The most independent category includes those residents who were independent, that is needed no help or just supervision, in performing both transfer and feeding. The most dependent category includes those residents who were dependent, that is needed help or were unable, in both transfer and feeding. The intermediate category includes those residents who did not fit into either of the other categories.

### Missing variables

Where a variable of interest was not available for inclusion in a particular data set, and no reasonably comparable item existed, that variable was omitted from analyses for that data set only. In some instances, a particular variable was not collected for all residents, either due to error or to the addition of a variable to a revision of the data collection instrument. When this occurred, the analyses were performed on the subset of residents who were assessed for that item; those with missing values were excluded only for the comparisons where the necessary data were not available.

### Analytic Measures

Cross-tabular analyses were performed by creating contingency tables comparing residents' status at Time 1 with status at Time 2 for each of the dependent (outcome) variables described above. Stratified analyses were performed by re-tabulating the same comparisons for different subsets of the population, for example for those residents with a particular diagnosis and again for those residents without a particular diagnosis. Included in the appendices are the complete sets of tables of transitions from Time 1 to Time 2.



## Functional outcomes

Within the body of the report, an overall summary for each of the functional outcomes investigated are presented. Changes in physical functioning, as measured by the ability to perform activities of daily living, are also provided in a summary format, by comparing the proportion of residents who move from dependency to independence and vice versa. Statistical tests of the influence of case-mix adjusters on functional changes were performed at the level of transition from dependence to independence and from independence to dependence.

An exception to this methodology was made for the Texas data set. Due to a lack of confidence in the functional measures, comparisons at the two points in time were not made. Chapter 6, which presents results of the Texas analyses, contains further information about this change in methodology.

## Clinical and service measures

The clinical care and service measures were analyzed in a similar manner. Summary tables were generated for the following dependent variables: contractures, decubitus ulcers, urinary tract infections, bladder/bowel training, and restraints. Copies of the full tables generated by the computer which show the cross-tabulation of the Time 1 by Time 2 values are contained in the appendices to this report.

The summary measures computed for these items were prevalence, incidence, and continued use (maintenance). For each data set a summary table for each measure is presented which contains the percentage of residents with the condition, and presents the percentages which represent 6-month rates for maintaining, discontinuing and developing the condition (incidence). For each percentage computed, the numerator and denominator on which the percentage was based are shown. Definitions used in computing these measures are described below:

**Prevalence (at Time 1)** The proportion of persons with the condition or receiving the service at the time of the first assessment (Time 1).

**Maintenance** The percent of residents who had the condition or service at Time 1, who still had it at Time 2 (6 months later) and were not discharged. The denominator for this group is the number of residents who had the condition (service) at Time 1 and were still in the facility at Time 2 (i.e. were eligible to have maintained).

**Discontinued** The percent of residents who had the condition or service at Time 1, who no longer had it at Time 2 (6 months later) and were not discharged. The denominator for this group is the number of residents who had the condition (service) at Time 1 and were still in the facility at Time 2 (i.e. were eligible to have maintained).

**Note:** The measures maintenance and discontinued are somewhat redundant in that the sum of these two items equals 100%.



Incidence (New Cases) The percent of residents who did not have the condition (service) at Time 1 who developed the condition (or began to receive the service) by the time of the Time 2 measure 6 months later. The denominator for this group includes only those residents who did not have the condition at Time 1 and were still in the facility at Time 2.

### Statistical testing

Statistical testing was performed to test the association between each of the potential case-mix adjusters and the outcomes of interest. Two-way contingency tables were tested using the chi-square test. For tables where expected cell counts were less than 5, a Fisher's exact test was used. The chi-square test for trend was performed for comparisons involving the 3-level summary ADL (Fleiss, 1981). However, since a linear effect was not hypothesized for age, the overall chi-square test was used when age was the independent variable being tested.

In all cases, statistical significance reported in these longitudinal outcomes analyses refers to p-value less than 0.001. Due to the multiplicity of comparisons being made in these analyses and the variation in the numbers of residents affected, this conservative p-value was felt to be most prudent.





Figure 3-1

## Specific comparisons tested, Brown University Nursing Home Case-Mix Project

<u>Independent Variables</u> (At Time One)											
	Hip fracture	Stroke/paralysis	Comatose	RUGs clinically complex (1)	Diabetes	CHD	RUG-II (15 groups)	Mental status (2)	Age (3) 65-89 90+	3-level Catheter (4)	Female
<u>Dependent Variables</u> (At Times One and Two)											
<u>ADL items</u>											
Feeding		X	X	X	X			X	X		
Transfer	X	X		X		X		X	X		
Mobility	X	X		X		X		X	X		
Continence/Toileting	X	X	X	X	X			X	X	X	X
<hr/>											
<u>Clinical &amp; Service Items</u>											
Contractures	X	X	X	X			X		X	X	
Decubitus	X	X	X	X	X	X	X		X	X	
UTI	X	X	X		X		X		X	X	X
Bladder/Bowel training	X	X						X	X	X	
Restraints	X				X		X	X	X	X	

Notes

1. RUGs Clinically Complex = residents without severe behavioral problems who have the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.
2. Mental status: confused/disoriented vs. not confused/disoriented.
3. ADL: independent in transfer; intermediate; dependent in feeding.
4. Catheter: either indwelling or external urinary catheter.



## CHAPTER 4

### ANALYSIS OF NATIONAL HEALTH CORPORATION NURSING HOME RESIDENT OUTCOMES

#### Methods

##### Data collection system

The National Health Corporation (NHC) is a nationwide chain of nursing homes, with facilities primarily located in Tennessee, Missouri, and other states in the Southeast. Since 1976, a division of the National Health Corporation known as Patient Assessment Computerized has collected a variety of data on all nursing home residents in the NHC system. Assessments of residents are performed at several times during the course of a nursing home stay. Residents are assessed at admission, at discharge, when the level of care provided or the source of payment is changed, and periodically during a continued stay; intermediate care (ICF) residents are assessed every three months, and skilled care (SNF) residents are assessed monthly. For residents who die in an NHC nursing home, an assessment is filed reflecting the event.

These assessments are conducted using a standardized instrument. This instrument collects basic demographic data, level of care, payment source, physical and functional status, and the resident's use of medical and rehabilitative services. Included in these assessments are up to nine medical diagnoses, with one diagnosis identified as primary and the remainder considered secondary. A copy of this data collection form is contained in Appendix A.

##### Development of the analytic file

The file used in these analyses was developed in conjunction with the Social Research Department of the Hebrew Rehabilitation Center for Aged. From their files of NHC assessment records, all residents who had been assessed in one of 48 facilities between January 1, 1983 and March 31, 1983 were selected. The first assessment in this time period was selected as the resident's Time 1 assessment. If the resident had an assessment five to seven months after this Time 1 assessment, this record was selected as the resident's Time 2 assessment. In addition, the last record from the year 1983 for each resident with an appropriate Time 1 record was saved. Each resident in the file has a Time 1 record and a final record for the year. The file contains Time 2 records for 64.3 percent of the residents. The inclusion of the last record for the year provides information on deaths and discharges that occurred within seven months of the Time 1 assessment, and information about residents who remained in the nursing home but did not have an appropriate Time 2 measure.

From these final records, it was determined that 10.5 percent of the residents died in the nursing home within seven months of their Time 1 measure, and 24.5 percent of the residents were discharged within this same period. An additional group of 0.8 percent of the residents were missing a Time 2 measure. These residents were not assessed within five to seven months of their Time 1 assessment, but did not have a recorded discharge within these seven months.

Since the analyses to be performed on these data required measures at two points in time, those residents who were missing a Time 2 measure were

# THE HISTORY OF THE UNITED STATES

The history of the United States is a story of growth and change. From the first settlers to the present day, the nation has evolved through various stages of development. The early years were marked by exploration and settlement, followed by a period of rapid expansion and industrialization. The American Revolution and the subsequent years of the 18th and 19th centuries saw the nation's political and social structure take shape. The Civil War was a pivotal moment in the nation's history, leading to the abolition of slavery and the strengthening of the federal government. The late 19th and early 20th centuries were characterized by westward expansion, industrial growth, and the rise of the United States as a world power. The 20th century has seen significant social and political changes, including the Civil Rights Movement and the Vietnam War. The future of the United States remains uncertain, but its history provides a foundation for understanding the challenges and opportunities ahead.

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ineligible for inclusion in the sample file. Before excluding them, their values were compared with those of the group of residents who were assessed twice and those of the group that was discharged or died within seven months of their Time 1 measures in an effort to determine whether they were a significantly different group of residents.

#### Variable selection and construction

Many of the items required for these analyses were available on the NHC assessment instrument, and were used as they were originally coded. Several additional items were constructed using the available information.

##### Diagnosis codes

Six variables were created using the information about primary and secondary diagnoses. The ICD-9 codes were scanned for the codes representing hip fracture, stroke/plegia, congestive heart disease, diabetes, contractures, and urinary tract infections. Residents who had these among their diagnoses were coded as having the condition.

##### Recoded and combined items

The eating/feeding item was recoded to add a separate category for residents who were tube fed. A catheter variable was created based on information from the bladder continence item; residents with either internal or external catheters were considered catheterized.

A three-level ADL scale was constructed from the ADL items of transfer and eating/feeding. The three levels are:

- Independent: needs no help in Transfer and Eating/Feeding.
- Intermediate: needs help or is unable (including tube-fed) in either transfer or feeding (but not both).
- Dependent: needs help or is unable (including tube-fed) in both Transfer and Eating/Feeding.

NHC collects information of the number of decubitus ulcers present in each of the four stages. In order to reduce this four-item variable into a single item without losing a substantial amount of information, an item which codes the level of the resident's most severe sore was recorded.

Two separate items were created from the orientation variable. This orientation item records the staff assessment of the resident's three spheres of orientation: person, place, and time. This item was initially coded as follows:

- Clear (oriented) - The patient is oriented in all 3 spheres.
- Occasionally disoriented - The patient is disoriented in only 1 or 2 spheres and/or occasionally in all 3 spheres.
- Disoriented - The patient is usually disoriented in all 3 spheres.
- Comatose
- Unable to determine.

The first item created from this variable was a dichotomous comatose item. Residents who were coded as comatose on the orientation item were coded as

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and the role of the accounting department in ensuring the integrity of the financial data.

2. It is essential for the company to have a clear understanding of its financial position at all times, and this can only be achieved through a robust system of internal controls and regular audits.

3. The accounting department is responsible for providing timely and accurate financial reports to management, which are used to make informed decisions about the company's future.

4. In addition, the department must ensure that all financial transactions are properly documented and that the company's financial statements are prepared in accordance with the relevant accounting standards.

5. The importance of maintaining accurate records cannot be overstated, as it is the foundation upon which the company's financial health is built.

6. The accounting department must also be aware of the latest developments in accounting technology and ensure that the company's systems are up-to-date and secure.

7. Finally, the department must maintain a high level of transparency and communication with all stakeholders, including investors, creditors, and regulatory bodies.

8. By following these principles, the company can ensure that its financial data is accurate, reliable, and useful for decision-making.

9. The accounting department is a critical part of the company's financial management, and its role is to ensure that the company's financial health is always in good standing.

10. The importance of maintaining accurate records is a recurring theme throughout the document, and it is clear that this is a key priority for the company.

comatose on this new item. Residents classified in all of the other orientation categories were coded as not comatose.

The second item created from this variable was a mental status item designed to identify confused or disoriented residents. Residents who had originally been classified as 3=disoriented were placed in the disoriented category; the remaining residents were considered not disoriented.

The 16-category RUG-II scale was created for these data using an algorithm supplied by John Morris of the Hebrew Rehabilitation Center for Aged. This algorithm uses the items available on the NHC assessment form which are roughly equivalent to those used in the RUG-II classification schema. Although the items do not completely match those upon which the original New York State RUG-II system is based, this algorithm produces an estimate which is sufficient for the purposes of these analyses.

### Change in Physical Functioning

The following is a description of the initial physical functioning status and change in ability to perform activities of daily living for residents in National Health Corporation nursing homes. Change was measured six months after the initial assessment; percentages used in describing change are based on residents who remained in the facility at the second assessment. Activities examined include feeding ability, ability to transfer, mobility, toileting, and both bladder and bowel continence.

#### Feeding

In the NHC data system feeding is defined as "The process of getting food by any means from the receptacle (plate, cup, glass, etc.) to the body." This variable describes "...the patients' ability to get food into the body after the food is placed in front of him." There are three original levels of feeding on the NHC data collection form:

- No help - The patient feeds himself without the assistance of another person (regardless of manners).
- Help - The patient participates in feeding but requires the assistance of another person to perform the eating/feeding activity. Opening milk cartons and cutting meat are not considered "help".
- Unable to do - The patient is fed.

In addition to these three levels, an additional category was created to include tube-fed residents. In the NHC system, tube feeding is recorded as a separate item in the "Special Treatments" section. Special treatments are "... those procedures which require the knowledge and experience of a licensed nurse to administer, observe or supervise," and are recorded if they were "... provided 5 days consecutively during the time since the last abstract was completed." Tube feeding includes nasogastric or gastrostomy tube feeding. Residents who according to the "Special Treatments" section of the data collection form were tube-fed were removed from their original feeding category and were placed in the "tube fed" category for feeding.





### Initial distribution

More than half (56.5%) of the residents did not require any help in feeding themselves at Time 1 (See Table 4-1). Of those who were not totally independent, approximately equal proportions needed some help (16.9%) or were totally unable to feed (17.5%). Under 10 percent (9.1%) were tube fed.

### Discharges

Somewhat more than one-third of the residents had died or were discharged during the six-month study period (See Table 4-2). The death/discharge rate was highest among tube fed residents, at 51.7 percent. Discharge rates were in the 30%-40% range for the other categories.

### Change in feeding ability

More than three-quarters of the residents (78.2%) had not changed feeding status at Time 2 (See Table 4-2). The category with the most change was "needs help", with 28.3 percent changing to "no help" and 23.6 percent becoming "unable". The most stable category was "no help", with 86.3 percent of those who were in this category at Time 1 remaining the same at Time 2.

### Tube feeding

Nine percent of the residents in the sample were tube fed at Time 1. Of those who were tube fed at Time 1 and who remained in the facility at Time 2, 84.1 percent were still tube fed. For the 32 residents who discontinued tube-feeding status, most (21) were in the "unable" category at Time 2. The incidence of tube feeding among residents was 1.7 percent (47 of 2760 residents). Thirty percent of residents who were tube-fed at Time 1 died during the study period.

### Factors associated with change in eating ability

The proportion of residents who went from being independent ("no help") to dependent ("needs help", "unable", or "tube fed") during the six-month study interval was 13.7 percent (See Table 4-3). A slightly higher proportion, 15.5 percent, went from being dependent to independent. Diabetic residents and those who were disoriented each had higher rates of becoming dependent in feeding. Among those who were initially dependent in feeding, clinically complex residents and those who were disoriented were also more likely to become independent.

### Ability to transfer

The NHC instruction manual defines transferring as "Movement of the patient from bed to chair or wheelchair or to a standing position." There are three levels of transfer ability:

- No help - The patient can transfer him/her self without the assistance of another person.
- Help - The patient is at least partially weight-bearing but requires the assistance of another person to perform the transfer activity.





- Unable to do - The patient is non-weight bearing and does not participate, rather he is lifted to and from the bed or chair.

### Initial distribution

Somewhat less than one-quarter (21.2%) of the residents in the sample could transfer without help at the time of the first assessment (See Table 4-1). The remaining residents either needed help (38.5%) or were unable to transfer (40.2%).

### Discharges

The death/discharge rate varied by ability to transfer, with residents who needed help having the highest rate, 40.7 percent, and those able to transfer by themselves having the lowest, at 23.3 percent (See Table 4-4). Residents who were totally unable to transfer had a death/discharge rate of 36.3 percent.

### Change in ability to transfer

More than three-quarters of the residents (77.7%) remaining in the facility at the second assessment had the same transfer ability as on the first assessment (See Table 4-4). The most stable category was "unable", with 85.1 percent of residents who were unable at Time 1 remaining in this category at Time 2. However, the "no help" category had a similarly high rate of stability, 84.1 percent. The most unstable category was "needs help", with 35.2 percent of residents who needed help at Time 1 no longer in this category at Time 2. Of those needing help at Time 1, 19.9 percent were unable to transfer at Time 2, and 15.3 percent no longer needed help to transfer (64.8% remained in the "needs help" category).

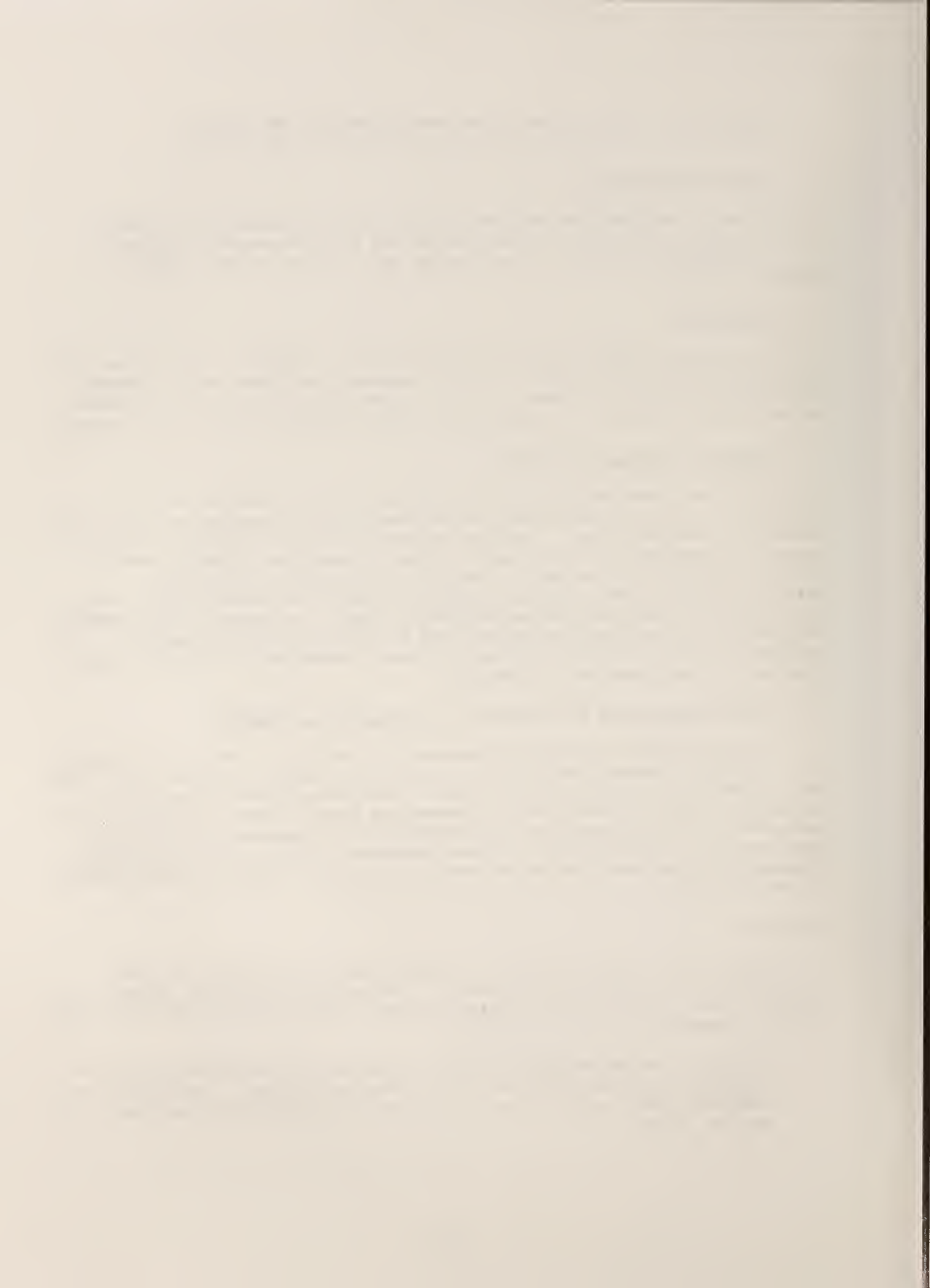
### Factors associated with change in the ability to transfer

Of the residents who were independent ("no help") at Time 1, 15.9 percent were dependent (needing some help or being totally unable) at Time 2 (See Table 4-5). Conversely, less than 10 percent (7.8%) changed from dependent to independent over the study period. Congestive heart disease was significantly associated with the transition from independence to dependence in transfer. Residents with congestive heart disease were most likely to become dependent. Residents who were not disoriented were most likely to improve to independence in transferring.

### Mobility

Mobility was taken from the "walking/wheeling" item on the NHC data collection form. This item describes "...the patient's method of transporting himself...more often than not within the month covered by the abstract." There are six categories of mobility status:

- Walking - The patient walks without assistance or continued supervision from another person after he is in a standing position. Patient may use equipment (cane, walker, etc.) if he can do so without the assistance of another person.



- Walks/Help - Patient receives help from another person in a one to one relationship. Supervision is regarded as "help" if walking is permitted only with an observer present.
- Wheels Self - The patient uses the wheelchair without assistance once he is in the chair. The use of special equipment (power driven chair, amputee chair or one-arm drive) would be considered in this item if the patient uses them without the assistance of another person.
- Is Wheeled - The patient is transported in a wheelchair but does not propel or guide it. The patient may wheel himself short distances if he doesn't do it consistently the majority of the time.
- Bed-Chair Confined - The patient is confined to a stationary chair when he is out of bed.
- Bed-Confined - The patient is confined to the bed.

#### Initial distribution

Almost one fifth (17.0%) of the residents in the sample could walk alone at Time 1 (See Table 4-1). A slightly higher proportion of residents (19.9%) could walk with help. Residents who wheeled themselves made up 13.5 percent of the sample, while those who were wheeled comprised 20.0 percent of the residents. Somewhat more than one-fifth (21.2%) were bed/chair fast, and an additional 9.2 percent were bedfast.

#### Discharges

The category with the highest proportion of deaths/discharges was bedfast, with one-half (52.1%) of the residents in this category at Time 1 having died or been discharged by Time 2 (See Table 4-6). Residents who needed help walking died or were discharged at a 45.1 percent rate. The category with the lowest discharge rate was the "walks alone" category, with 22.1 percent of those who could walk at Time 1 having died or been discharged at Time 2.

#### Change in mobility

Almost two-thirds (64.5%) of the residents in the sample had the same mobility status at Time 2 as they did at Time 1 (See Table 4-6). The most stable category was "walks alone", with almost 80 percent of the residents who could walk alone at Time 1 maintaining this status at Time 2. The most unstable category was "walks with help", with more than half (56.1%) of those who needed help walking at the first assessment having changed their status by the second assessment. Most of those who changed went from needing help to being able to walk alone (20.9% of those who needed help at Time 1). The proportion of those who needed help at Time 1 who were in wheelchairs at Time 2 was identical (13.3%) between the two wheelchair categories of wheeling self and being wheeled. Less than 10 percent (8.5%) became bed/chair fast, while only one resident became bedfast.

#### Walking

More than one third (36.2%) of the residents in the sample could walk





either alone or with help at the time of the first assessment. Of these residents who were still in the facility at the time of the second assessment, more than three-quarters (80.6%) maintained the ability to walk alone or with help. Conversely, of those who could not walk alone or with help at Time 1, 5.9 percent could walk (alone or with help) at Time 2.

#### Factors associated with change in mobility

In assessing change in mobility, residents who needed no help walking or were able to wheel without help were considered independent. Over the 6 month study period, 18.5 percent of these initially independent in mobility became dependent (See Table 4-7). No subgroups of the population were more or less likely to experience this type of functional decline. Conversely, 16.2 percent of the residents who were dependent in mobility, that is those who needed any assistance, improved to independent in mobility. Residents with hip fracture and those who were not disoriented were most likely to improve.

#### Bedfast

The proportion of residents at the first assessment that were bedfast was 9.2 percent. Six months later, at the time of the second assessment, almost two-thirds of these residents who remained in the facility were still bedfast (See Table 4-5). Of the residents who were not bedfast at the first assessment, 3.0 percent became bedfast by the time of the second assessment. More than one-third of those bedfast at Time 1 had died during the study period.

The only significant association with transition to and from bedfast status was the mental status variable (See Table 4-8). Residents who were not bedfast and who were not assessed as disoriented were most likely to become bedfast.

#### Toileting ability

Toileting is defined in the NHC manual as "the ability to seat oneself and rise or transfer from the toilet and to cleanse oneself." There are three levels of toileting ability:

- No help - The patient is able to toilet without the assistance of another person.
- Help - The patient requires the assistance of another person to perform the toileting activity.
- Unable to do - the patient does not use the toilet room (instead uses bed pan and urinal or bedside commode).

#### Initial distribution

Twenty percent of the residents could toilet themselves without help at the first assessment (See Table 4-1). More than one-third (34.6%) needed help, and almost half (45.1%) were totally unable to toilet.

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## Discharges

The category with the highest proportion of discharges was "needs help", with a death/discharges rate of 42.0 percent (See Table 4-9). Of those residents who were totally unable to toilet at Time 1, 35.2 percent had died or been discharged at Time 2. The death/discharge rate for residents needing no help at Time 1 was 23.8 percent.

## Change in toileting ability

Three-quarters of the residents (77.6%) who remained in the facility at Time 2 had the same toileting ability as at Time 1 (See Table 4-9). The least stable category was "needs help", with 38.6 percent of residents who were initially in this category and remained in the facility at Time 2 having changed status. A somewhat smaller proportion of these residents changed their status to "no help" (17.7%) as did to "unable" (20.9%). The most stable category was "unable", with almost 90 percent of residents who were unable to toilet at Time 1 that remained in the facility at Time 2 still having this status.

## Factors associated with change in toileting ability

Of the residents that were independent at the first assessment, almost one-fifth had become dependent by the time of the second assessment (See Table 4-10). Of those who were dependent at Time 1, 8 percent had become independent during the study period. ADL was significantly associated with both decline and improvement in toileting ability. Greater dependence, as measured on the 3-level ADL scale, was associated with an increased likelihood of improvement in toileting ability. Residents who were not disoriented were also more likely to become independent in toileting, no longer needing help or being unable to use the toilet room.

## Bowel and bladder continence

Bladder and bowel continence are recorded separately in the NHC data collection system. The items from which this variable was taken describe the resident's usual bladder and bowel function. The six levels of bladder functioning are:

- Continent - Patient has bladder control or has an external device or catheter that he/she cares for independently. Includes the patient who only has an accident once/week or less frequently.
- Occasionally incontinent - The patient requires assistance in handling bladder elimination and has infrequent accidents. Includes the patient who has an accident more frequently than 1 time per week but not daily.
- Incontinent - Patient has inadequate control of bladder elimination and has frequent accidents or has an external device that he/she does not handle himself. Includes the patient who has at least one accident per day.
- Catheter, indwelling - Patient has an indwelling or suprapubic catheter.
- Catheter, external - Patient has an external catheter.





- Ostomy - Patient has an ileo-conduit.

The four levels of bowel functioning are:

- Continent - Patient has bowel control.
- Occasionally incontinent - Patient has infrequent bowel incontinence accident.
- Incontinent - Patient has inadequate bowel control and frequent accidents.
- Ostomy - Patient has an ileostomy or colostomy.

#### Bladder continence: Initial distribution

At the first assessment 41.6 percent of the residents were continent of bladder (See Table 4-1). Residents who were occasionally incontinent of bladder comprised 12.0 percent of the sample, and those who were totally incontinent made up 24.6 percent of the total number of residents. Catheterized residents accounted for 21.4 percent of the sample at Time 1 (18.7% had indwelling catheters and 2.7% had external catheters).

#### Discharges

Residents with indwelling catheters had the highest death/discharge rate, at 50.2 percent. Continent and occasionally incontinent residents had similar death/discharge rates (35.0% and 34.5%, respectively). Bladder incontinent residents had a death/discharge rate of 25.3 percent.

#### Change in bladder continence

There was no change in bladder continence for 74.3 percent of the residents who were still in the facility at Time 2 (See Table 4-11). Residents who were occasionally incontinent of bladder at Time 1 had the highest rate of change, at 48.8 percent. Approximately equal proportions of these residents were continent at Time 2 as were incontinent (22.4% and 21.6%, respectively). Continent residents made up the most stable group, with 83.2 percent of those who were bladder continent at Time 1 and still in the facility at Time 2 remained continent.

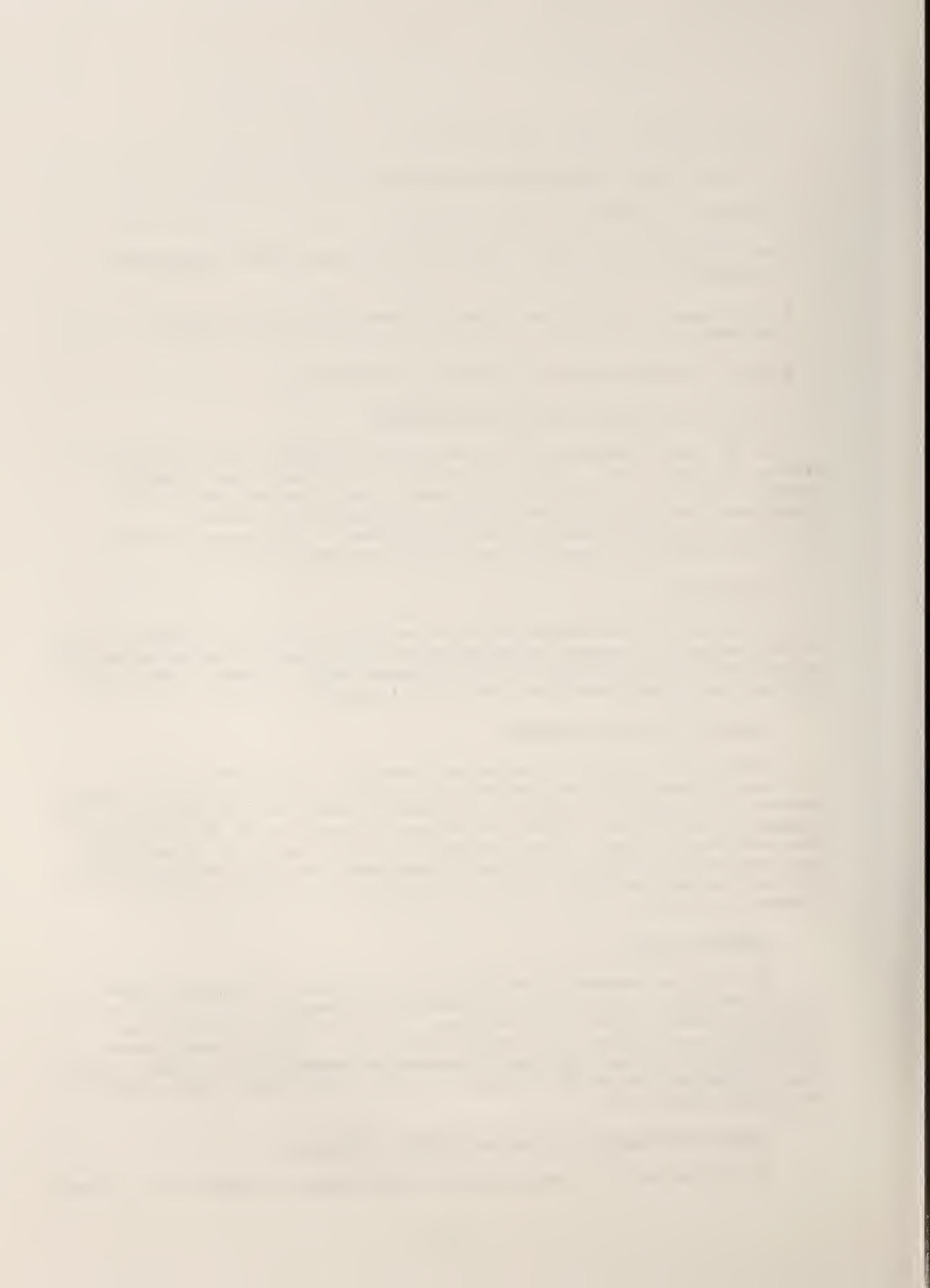
#### Catheterization

At the first assessment one-fifth of the residents were catheterized (18.7% with indwelling and 2.7% with external catheters). At the time of the second assessment, almost three-quarters (74.7%) of these residents who remained in the facility still were catheterized. Catheters were present in 4.6 percent of residents at Time 2 who were not catheterized at Time 1. More than one-quarter (26.4%) of residents who were catheterized at Time 1 died during the study period.

#### Factors associated with change bladder continence

Of the residents who were continent at the first assessment, 16.8 percent





were incontinent of bladder (either occasionally, totally, or catheterized) at the time of the second assessment (See Table 4-12). Conversely, of those residents who were incontinent at Time 1 and remained in the facility, 8 percent were continent at Time 2. Two factors were associated with change in bladder continence: disoriented mental status and ADL. Disoriented residents were more likely to become incontinent and less likely to regain continence. The trend associated with ADL shows that residents with worse function are also more likely to become incontinent and are less likely to regain continence.

#### Bowel continence: Initial distribution

Almost half of the residents were continent of bowel at Time 1 (See Table 4-1). Of those who were not continent, a much higher proportion were totally incontinent than were occasionally incontinent (40.3% versus 10.8%).

#### Discharges

Slightly more than one-third of bowel continent residents were no longer in the facility after 6 months; this rate is approximately the same as for those who were occasionally incontinent or incontinent (See Table 4-13). Residents with an ostomy at Time 1 had the highest overall death/discharge rate at 42.2 percent, but that was based on only 45 residents at Time 1.

#### Change in bowel continence

More than 80 percent of the residents remaining in the facility at the time of the second assessment had the same level of bowel continence at the time of the second assessment as they did at the first (see Table 4-13). The most change (55.9%) occurred among those who were occasionally incontinent at Time 1, with somewhat more of these residents becoming incontinent (32.6%) than becoming continent (23.3%). The least change occurred among those who were incontinent at Time 1, with 87.9 percent of these residents who were still in the facility at Time 2 remaining incontinent.

#### Factors associated with change bowel continence

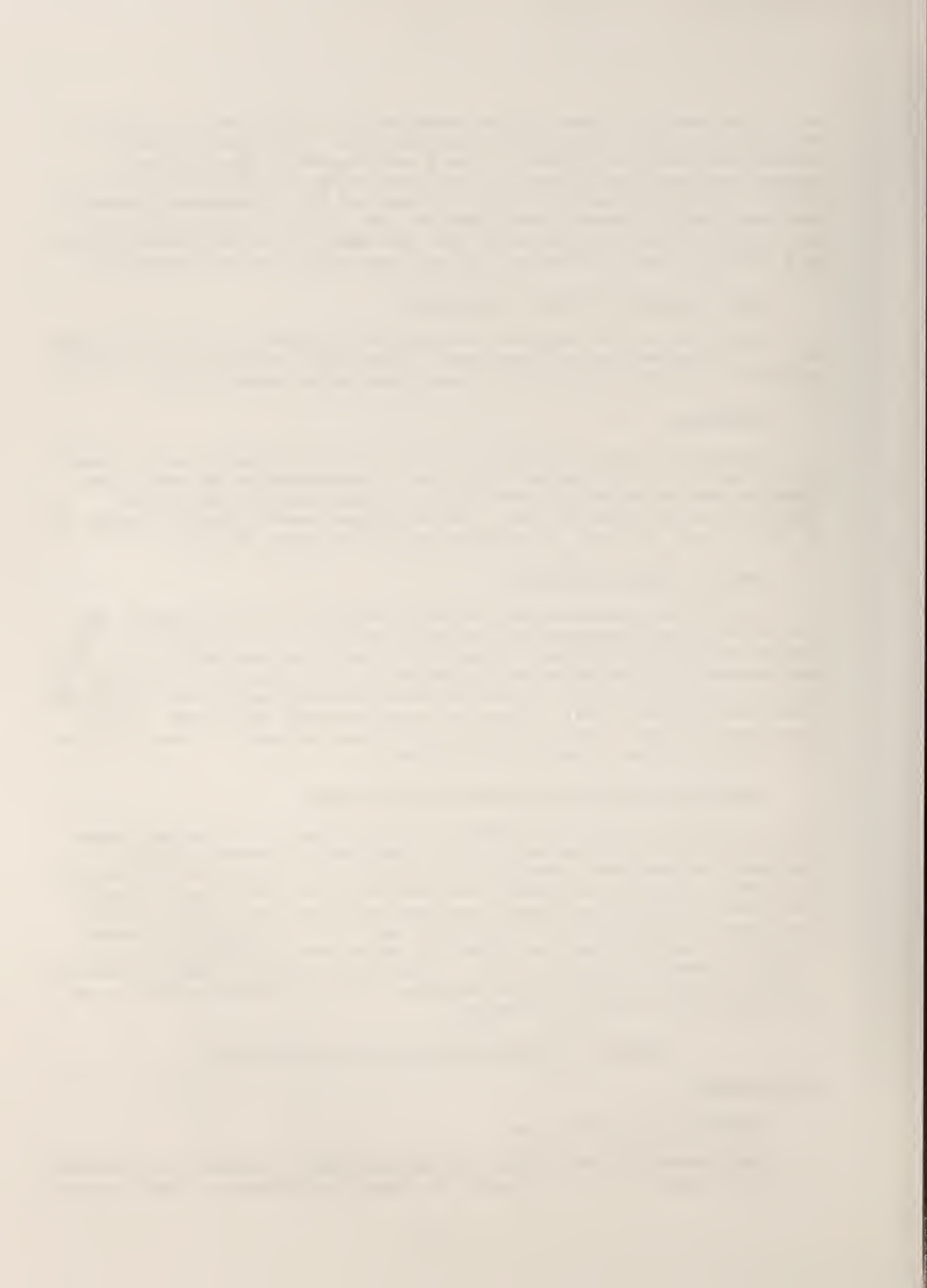
Of residents who were continent of bowel at Time 1, 15.6 percent became incontinent by Time 2 (See Table 4-14). Less than 10 percent of those residents who were bowel incontinent at Time 1 and were still in the facility six months later were continent. The same two factors which were associated with change in bladder continence were also associated with change in bowel continence: disoriented mental status and ADL. As with bladder continence, disoriented residents were more likely to become bowel incontinent and less likely to regain their bowel control. The trend associated with ADL shows that residents with worse function are also more likely to become incontinent and are less likely to regain continence.

#### Clinical Conditions and Service-Related Outcomes

##### Contractures

##### Prevalence of contractures

The presence of contractures was detected from a review of the diagnoses that were listed for each resident. The overall prevalence of contractures in



the sample of NHC residents was 2.9 percent. Characteristics related to presence of contractures were stroke/plegia, age, and ADL dependence (See Table 4-15). Residents with stroke/plegia were more than two times likely to have contractures present at Time 1 than those without stroke/plegia. Younger residents (under 65 years of age) had a higher prevalence rate (6.6%) than the intermediate (65-89) or oldest (90 years of age or older) categories. The prevalence of contractures was also related to physical dependence, with the most dependent group on the three-item ADL scale having a prevalence rate of 5.2 percent, compared with the intermediate and most independent groups with rates of 1.7 percent and 0.4 percent respectively.

#### Recovery from contractures

Residents with contractures at Time 1 were more than twice as likely to remain in the facility during the study period than residents without contractures. For the study period, 11.9 percent of residents remaining in the facility at the second assessment no longer had contractures. The remainder of residents who had contractures initially and were in the facility at Time 2 still had contractures (88.1%). There were no factors among those tested which were significantly related to recovery/maintenance.

#### Incidence of contractures

The overall incidence rate of contractures was 2.1 percent. Of the factors tested, only ADL was associated with incidence, with dependent residents having a much higher incidence (4.3%) than the intermediate (1.1%) or independent.

#### Summary: Contractures

The factor most often associated with contractures was ADL, with dependent residents (in both transfer and feeding) having higher rates of Time 1 prevalence and Time 2 incidence. Residents with stroke/plegia and residents under 65 years of age also had higher rates of prevalence.

#### Decubitus ulcers

A separate item is included for decubitus ulcers on the NHC data collection form. NHC records 4 stages of decubitus (I,II,III,IV). The number of ulcers/areas the patient has in each of the four stages is recorded on the form. The descriptions of the stages are:

- Stage I - Reddened area only (which does not clear with gentle hand massage and repositioning of the patient), no break in the skin.
- Stage II - Reddened area with superficial skin break or formation of vesicles and abrasion.
- Stage III - Full thickness loss of skin which may or may not include subcutaneous tissues and produces serosanguinous drainage.
- Stage IV - Full thickness loss of skin with invasion of deeper tissues.

For the analysis, decubitus ulcers were examined in two ways: The presence of at least one ulcer in any stage (i.e., a dichotomous yes/no

1. The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for the transparency and accountability of the organization. This section also outlines the various methods used to collect and analyze data, ensuring that the information is reliable and up-to-date.

2. The second part of the document focuses on the implementation of the proposed changes. It details the steps involved in the transition process, from the initial planning stage to the final execution. This section also addresses the potential challenges that may arise during the implementation phase and provides strategies to overcome them.

3. The third part of the document discusses the long-term impact of the changes. It explores how the new system will affect the organization's overall performance and how it will contribute to the achievement of its strategic goals. This section also includes a discussion on the ongoing monitoring and evaluation of the system to ensure its continued effectiveness.

4. The fourth part of the document provides a summary of the key findings and conclusions. It highlights the main points discussed throughout the document and emphasizes the importance of the proposed changes. This section also includes a list of recommendations for further action and a timeline for the implementation of the changes.

5. The fifth part of the document is a conclusion. It reiterates the importance of the proposed changes and expresses confidence in the organization's ability to successfully implement them. It also includes a final statement on the commitment to transparency and accountability.



variable) and the most severe level of decubitus present.

#### Prevalence of decubitus ulcers

The overall prevalence of decubitus ulcers in the sample was 15.6 percent. Of the residents with ulcers, 28.4 percent had a Stage I ulcer as their most severe sore, 33.0 percent had Stage II, 23.2 percent had Stage III, and 15.4 percent had Stage IV as their most severe (See Table 4-1).

Characteristics associated with prevalence were stroke/plegia, comatose, clinically complex profile, age, ADL, and diabetes (See Table 4-16). Comatose residents had a rate of 44.1 percent (compared with 14.3% for non-comatose residents). Residents with stroke/plegia were more likely to have a decubitus than those without stroke. Diabetic residents had a higher likelihood than non-diabetic residents. Those residents with a clinically complex profile were about half as likely to have a pressure sore than those who were not clinically complex.

#### Recovery from decubitus ulcers

Residents with decubitus ulcers were less likely to be in facility at Time 2 than were residents who did not have any sores at Time 1. The rates of death and discharges combined were 50.9 percent and 32.3 percent, respectively. The overall recovery rate (improvement from any sore(s) to no sores) for decubitus ulcers was 45.6 percent for residents who had an ulcer at Time 1 and who were still in the facility at Time 2. The remainder of those who had an ulcer initially and who were in the facility at the second assessment (54.4%) still had at least one ulcer.

In terms of changes in most severe level of decubitus, 60.4 percent of residents with a sore at Time 1 had improved to either a lower level (i.e., less severe) sore at Time 2, or to no sores. For 14 percent of those with sores at Time 1, the severity level of decubitus increased over the study period. One third of those residents with a Stage IV decubitus as their most severe level died during the study period.

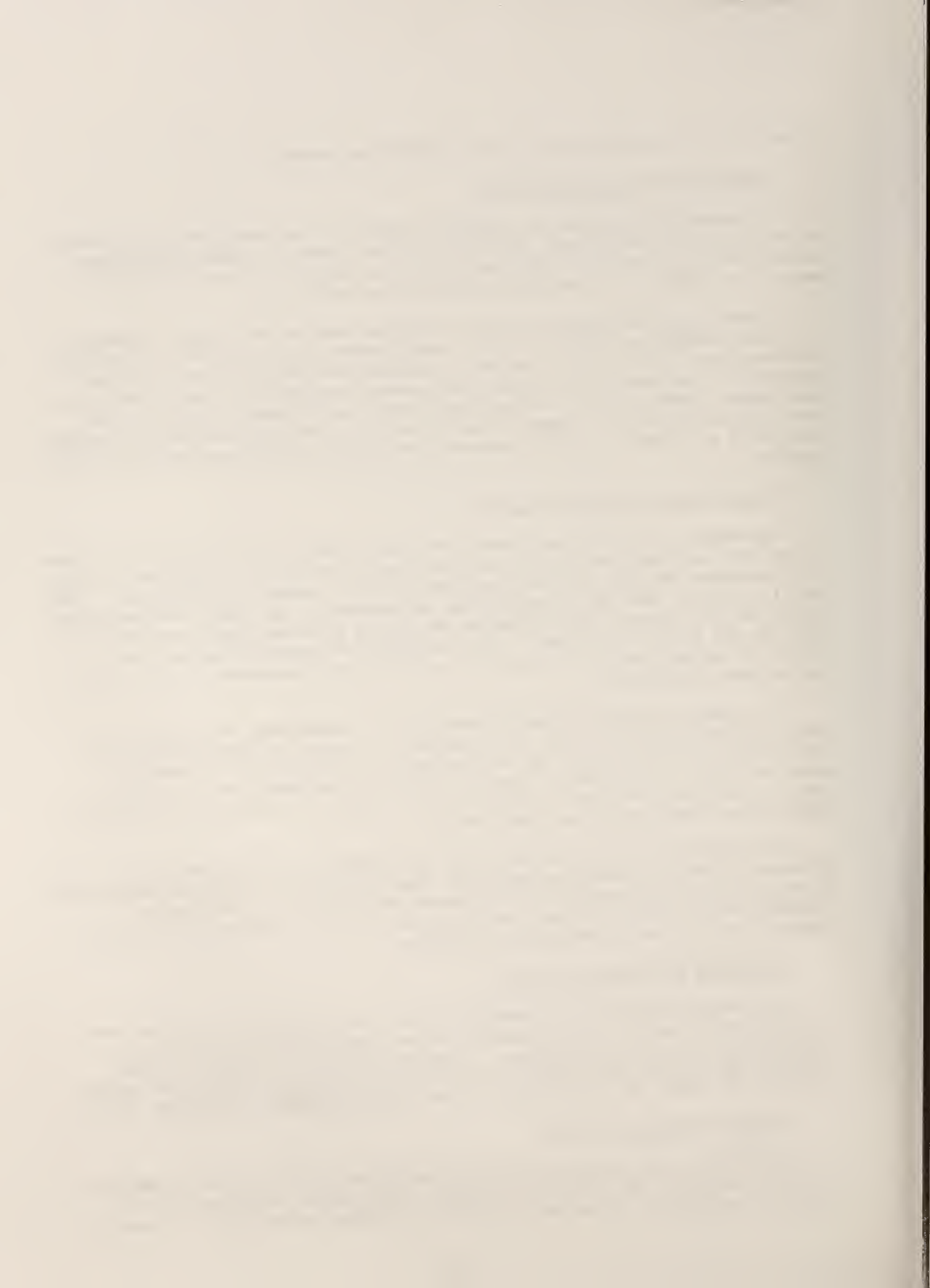
The only factor examined here which was associated with recovery of decubitus ulcers was comatose condition (See Table 4-16). Comatose resident had a very low rate of recovery from decubitus; only one-fourth of comatose residents with a sore at Time 1 had no sores at Time 2, compared with the 46 percent recovery for non-comatose residents.

#### Incidence of decubitus ulcers

The overall incidence of decubitus ulcers in the sample was 6.0 percent. Of the factors tested, only dependency on the three-item ADL scale was significantly related to incidence. Residents who were dependent in both transfer and feeding had an incidence rate of 10.5 percent, which was higher than that for both the intermediate (4.7%) and independent categories (2.1%).

#### Summary: Decubitus ulcers

The factor most strongly related to decubitus ulcers was being comatose: comatose residents had a much higher Time 1 prevalence, and were much more likely to maintain their ulcers, than were non-comatose residents. Physical



dependence (ADL level) was also related to both higher prevalence and incidence of decubitus ulcers. Stroke/plegia and diabetes were also related to higher prevalence of decubitus, while having a clinically complex profile was associated with a lower prevalence of decubitus. Age was also related to prevalence, with residents in the 65-89 category having a higher prevalence of decubitus than both those under 65 years of age or those age 90 or older.

### Urinary tract infections

#### Prevalence of urinary tract infections

The presence of urinary tract infection was detected from a review of the diagnoses that were listed for each resident. The prevalence of urinary tract infections for the sample as a whole was 8.0 percent. Prevalence was related to ADL and to catheterization (See Table 4-17). The most independent and intermediate residents had lower prevalence (3.7% and 7.2%, respectively) than the most dependent residents (10.7%). Catheterized residents were three times more likely to have a urinary tract infection at Time 1 than non-catheterized residents.

#### Recovery from urinary tract infections

The death/discharge rates for those with/without a urinary tract infection at Time 1 were comparable (33.9% and 35.5%, respectively). Overall, more than 80 percent (83.5%) of the residents who had an infection at Time 1 and who remained in the facility at Time 2 still had the same or a new urinary tract infection six months later. Less than 20 percent (16.5%) did not have an infection at six months. There were no significant associations between recovery/maintenance of urinary tract infection and any of the resident characteristics that were tested in the analysis.

#### Incidence of urinary tract infections

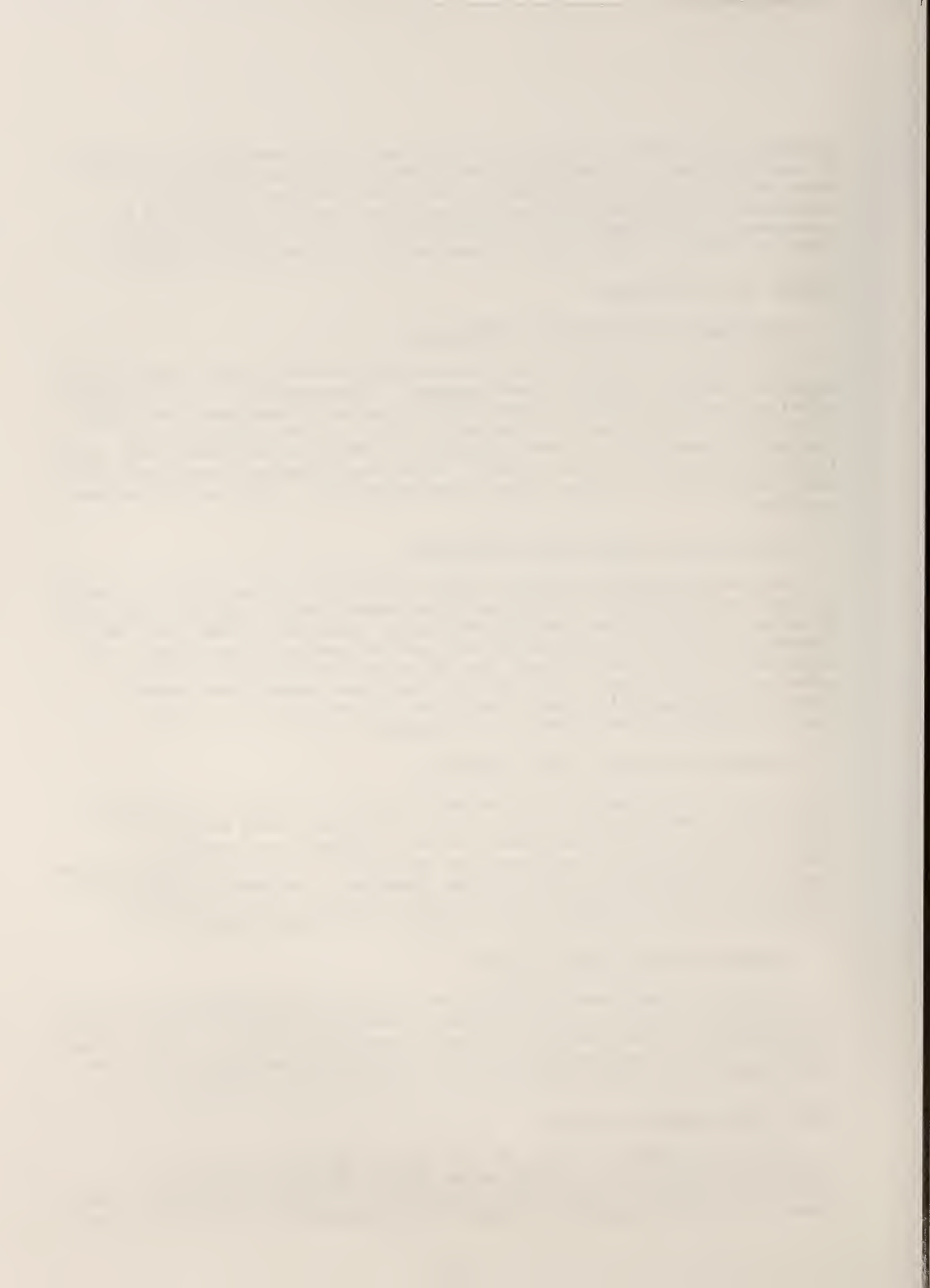
Overall, 1.7 percent of the residents who did not have a urinary tract infection at Time 1 and were still in the facility at Time 2 developed an infection during the six-month study period. Incidence was related to catheterization and ADL. Residents with catheters had a rate that was four and one-half times greater than those without catheters. Dependent residents had the highest rate of incidence (3.5%), while independent and intermediate residents had about the same rates (0.6% and 0.7%, respectively).

#### Summary: Urinary tract infection

Two factors were associated with both prevalence and incidence of urinary tract infection: ADL and catheterization. Catheterized residents and those who were dependent in both transfer and feeding were about three times more likely to have a urinary tract infection at Time 1, and were also about three times more likely to have developed an infection during the study period.

### Bowel and/or bladder training

Bowel and bladder training are included in the NHC data system as a Rehabilitative Services. The NHC manual defines Bladder Training as a structured program to regain bladder control or to prevent incontinence, while Bowel Training is defined as a program to retrain/regain bowel control. The





goal of these services are to prevent complications, maintain present functioning, or to cause improvement. The presence of either one or both of these training programs in a residents record is examined in the analysis.

#### Prevalence of bowel and/or bladder training

Almost 15 percent of the residents in the sample were on some type of bowel and/or bladder training program at Time 1 (See Table 4-18). Residents who were disoriented and those who were dependent in the three-item ADL were most likely to be on such a program. Almost 20 percent of disoriented residents were receiving some type of training, nearly twice the rate for residents who were not disoriented. Dependent residents were ten times more likely to be on a training program than independent resident (25.2% versus 2.5%), and about three times more likely than intermediate residents (8.5%).

#### Discontinuation of bowel and/or bladder training

At Time 2, a higher proportion of the residents who were receiving bowel/bladder training at Time 1 had died or been discharged than of those residents who had not been receiving such training (50.8% versus 32.6%). Half of the residents initially receiving training were no longer on a training program six months later (at Time 2). Conversely, just over half were still on a training program. There were no significant associations between any of the resident characteristics tested and discontinuation of bowel/bladder training.

#### Incidence of bowel and/or bladder training

The overall incidence of of bowel and/or bladder training for the sample as a whole was 5.2 percent. Incidence was associated with being disoriented and with ADL. Disoriented residents were nearly three times more likely to begin bowel and/or bladder training residents who were not disoriented. Incidence of bowel/bladder training increased with increasing physical dependency, with the most independent residents on the three-item ADL scale having an incidence rate of 1.7 percent, intermediate residents having a rate of 3.8 percent, and the most dependent residents (those dependent in both transfer and feeding) having an incidence of 9.4 percent.

#### Summary: Bowel and/or bladder training

Resident characteristics associated with both receiving bowel/bladder training at Time 1 and being put on a training program during the study period were being disoriented and being dependent in both transfer and feeding.

#### Restraints

The use of restraints is coded in the NHC data system according to both type and purpose for use. Type of restraint is separated into physical, defined as "A mechanical device (such as arm restraints, posey belts) used to limit movement," and chemical, defined as "A drug used to limit movement or aggressive behavior." Residents can be coded as having either none, physical or chemical restraints, or having both types used concurrently ("Combined"). When restraints are coded as being used, the purpose for use is also coded.

Restraints may be used for either safety purposes or control purposes. According to the NHC manual, safety restraints are used to "protect the patient



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PHILOSOPHY DEPARTMENT

PHILOSOPHY 101

PHILOSOPHY 102

PHILOSOPHY 103

PHILOSOPHY 104

from from injuring himself." Restraints are used for control when the purpose is "to control the patient's behavior or activity so that he does not injure others." As with the use of combined types of restraint, a resident may be coded as being under the application of restraints for either safety, control or for both purposes. A given restraint application may address the safety issue, while another may be used for control. In some cases, the same restraint may be used for both safety and control purposes.

#### Prevalence of use of restraints

The overall rate of use of restraints for safety was 47.2 percent. Factors associated with restraints use for safety were being disoriented, age, and dependency on the three-item ADL scale (See Table 4-19). Disoriented residents were four times as likely to have restraints at Time 1 than were residents who were not disoriented (odd ratio 4.06). Older residents were somewhat more likely to have safety restraints than younger residents: 53.2 percent of residents 90 years of age and over, 46.4 percent of those 65-89 years of age, and 43.0 percent of those under 65 years of age.

Restraints were used for control for just over ten percent of the sample at Time 1. Disoriented mental status and ADL were related to the their use at Time 1 (See Table 4-20). Residents who were disoriented had restraints applied for control almost three times more often than those who were not disoriented. The most physically dependents resident on the three-item ADL scale (those dependent in both transfer and feeding) had a higher rate of prevalence (13.5%) than those in the intermediate (9.0%) or independent categories (5.5%).

#### Discontinuation of use of restraints

There were no differences in discharge rates for between those who had restraints applied for safety at Time 1 and those who did not have them applied. The rate of discontinuation of safety restraints for the sample as a whole was 14.8 percent (See Table 4-19). Mental status (i.e. disoriented) and ADL status were related to discontinuation. Residents who were not disoriented had higher rates of discontinuation than those who were disoriented (19.1% versus 11.2%). Discontinuation of restraints also was related to ADL independence, with residents in the most independent category having the highest discontinuation rate of all residents, 41.5 percent. Those in the intermediate category had a rate of 13.2 percent, while those in the most dependent category had discontinued the use of restraints in 12.2 percent of the cases.

The rate of discharge for residents who were under the application of restraints for control at Time 1 was not significantly different from the discharge rate of those without restraints. Only mental status was significantly related to the discontinuation of control restraint use, with 36.3 percent of disoriented residents no longer having restraints applied, compared with 56.8 percent of those residents who were not disoriented (See Table 4-20).

#### Incidence of use of restraints

The overall incidence of new cases of restraint use for safety purposes was 15.5 percent. Incidence was associated with mental status and ADL status (See Table 4-19). One fourth of disoriented residents had restraints newly

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applied for safety, more than double the rate of residents who were not disoriented. The most dependent residents had a much higher occurrence of new application of restraints for safety (27.6%) than residents in either the intermediate category (17.0%) or the most independent category (8.6%).

The overall incidence of new use of restraints for control for the sample was 4.7 percent. Disoriented residents were twice as likely to have restraints newly applied for control than were non-disoriented residents (See Table 4-20).

Summary: Restraints for safety and control

The factor most consistently associated with the use of restraints for both safety and control was being disoriented. Disoriented residents had higher rates of restraint application at Time 1 and higher rates of new application of restraints during the six-month study period. Also, disoriented residents were less likely to have such use discontinued during the study period. Physical dependence, measured on the three-item ADL scale was also related to use of both types of restraints at the time of the first assessment. Dependence was also related to the maintenance as well as new application of the use of restraints for safety at the time of the second assessment. Age was related to the use of restraints for safety at Time 1, but was not related to the use of restraints for control. Residents 90 years of age and over also had higher rates of application at the time of first assessment.





Table 4-1

Distribution of Time 1 characteristics, National Health Corporation nursing homes, 1983

DEMOGRAPHIC CHARACTERISTICS			FUNCTIONAL ASSESSMENT (cont'd)		
	n	%		n	%
Age			Bowel continence		
<65	456	9.9	Continent	2202	47.9
65-89	3383	73.6	Occas. incont.	497	10.8
90+	756	16.5	Incontinent	1851	40.3
			Ostomy	45	1.0
Sex					
Male	1409	30.7			
Female	3186	69.3			
			CLINICAL CONDITIONS		
			Comatose	118	2.6
FUNCTIONAL ASSESSMENT			Disoriented	412	31.7
Feeding			Contractures	135	2.9
No help	2598	56.5	Diabetes	654	14.2
Help	776	16.9	Urinary Tract Infection	366	8.0
Unable	805	17.5			
Tube fed	416	9.1	Hip Fracture	413	9.0
Transfer			Stroke/Plegia	669	14.6
No help	975	21.2			
Help	1771	38.5	Congestive Heart Disease	482	10.5
Unable	1849	40.2	Most Severe Decubitus Level		
3-Level ADL (based on feeding and transfer)			None	3880	84.4
Independent	949	20.7	1	203	4.4
Intermediate	1677	36.5	2	236	5.1
Dependent	1969	42.8	3	166	3.6
Mobility			4	110	2.4
Walks	783	17.0			
Walks w/help	879	19.1	SERVICE-RELATED ITEMS		
Wheels self	621	13.5			
Wheeled	921	20.0	Bowel and Bladder Training	661	14.4
Bed/chair fast	970	21.1			
Bedfast	421	9.2	Restraints		
Toileting			Safety	2168	47.2
No help	934	20.3	Control	469	10.2
Help	1590	34.6			
Unable	2071	45.1			
Bladder continence					
Continent	1911	41.6			
Occas. incont.	551	12.0			
Incontinent	1132	24.6			
Indwell. catheter	861	18.7			
Extern. catheter	125	2.7			
Ostomy	15	.3			

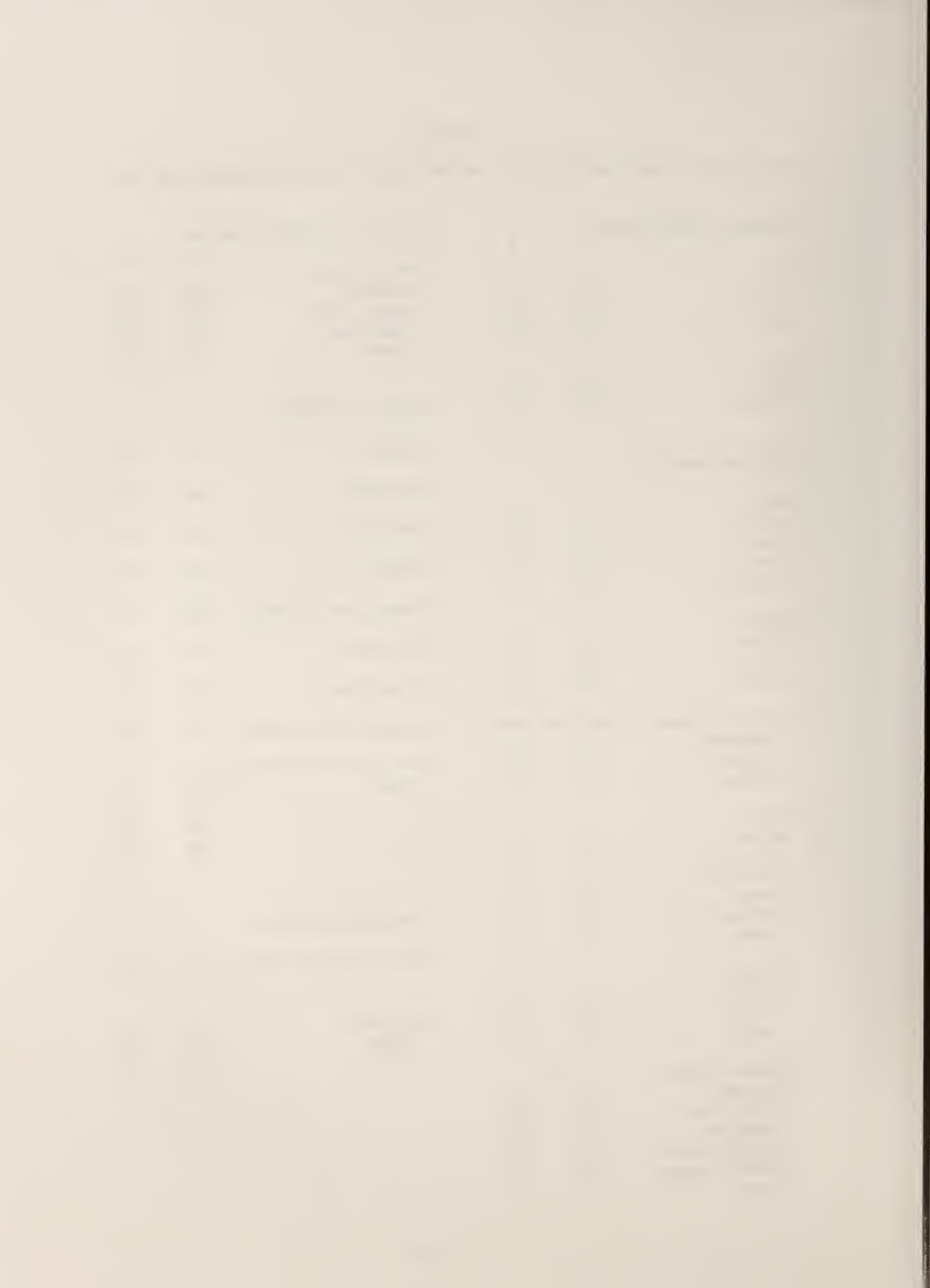


Table 4-1 (cont'd)

Distribution of time 1 characteristics, National Health Corporation nursing homes, 1983

RUG-II CLASSIFICATION

	n	%
Resource Utilization Group (RUG-II)		
Special Care A	310	6.7
Special Care B	889	19.3
Heavy Rehab A	67	1.5
Heavy Rehab B	506	11.0
Clinical Complex A	180	3.9
Clinical Complex B	406	8.8
Clinical Complex C	189	4.1
Severe Behavior A	15	.3
Severe Behavior B	77	1.7
Severe Behavior C	9	.2
Reduced Phys. A	585	12.7
Reduced Phys. B	115	2.5
Reduced Phys. C	1111	24.2
Reduced Phys. D	135	2.9
Reduced Phys. E	1	.0



Table 4-2

Change in ability to feed over 6 month period for nursing home residents remaining in the facility, National Health Corporation facilities, 1983

		TIME_2				ROW TOTAL	Died or Discharged
TIME_1		No help	Needs help	Unable	Tube Fed		
No help		1559	166	69	13	1807	791
						60.7	(30.4)
		134	219	112	9	474	302
						15.9	(38.9)
Needs help		43	45	381	25	494	311
						16.6	(38.6)
Unable		4	7	21	169	201	215
						6.8	(51.7)
Tube Fed		1740	437	583	216	2976	1619
		58.5	14.7	19.6	7.2	100.0	(35.2)





Table 4-3

Changes in feeding dependency status over 6-month period for residents in  
National Health Corporation nursing homes, 1983

		<u>Independent to Dependent</u>			<u>Dependent to Independent</u>		
		<u>percent</u>	<u>n</u>	<u>p</u>	<u>percent</u>	<u>n</u>	<u>p</u>
Overall		13.7	(248/1807)		15.5	(181/1169)	
1							
Stroke/Plegia	Yes	13.1	(29/221)		15.2	(34/223)	
	No	13.8	(219/1586)	.86	15.5	(147/946)	.99
2							
Clinically Complex	Yes	16.7	(62/371)		23.7	(36/152)	
	No	13.0	(186/1436)	.07	14.3	(145/1017)	.00
1							
Diabetes	Yes	19.5	(52/267)		16.7	(26/156)	
	No	12.7	(196/1540)	.00	15.3	(155/1013)	.75
Confused/ Disoriented	Yes	27.9	(96/344)		9.8	(61/623)	
	No	10.2	(147/1435)	.00*	24.0	(116/483)	.00*
Age	<65	8.8	(14/160)		10.6	(15/142)	
	65-89	13.7	(181/1324)		17.5	(144/824)	
	90+	16.4	(53/324)	.07	10.8	(22/203)	.01

\* p < .001

1

Based on ICD-9 code for any of 9 listed diagnoses.

2

RUG-II category which includes residents without severe behavioral problems who have at least one of the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.

THEORY OF THE EARTH AND ITS HISTORY

CHAPTER I. OF THE ORIGIN OF THE EARTH

THE EARTH, as we see it, is a globe, or sphere, of a very great size. It is composed of a solid mass of matter, which is divided into several parts, or regions, called continents, islands, and seas. The continents are the large tracts of land, which are separated from each other by seas or oceans. The islands are small tracts of land, which are surrounded by water. The seas or oceans are the vast expanses of water, which cover the greater part of the earth's surface. The earth is also divided into several parts, or regions, called climates, or zones. These are the regions, which are distinguished by their temperature, and the nature of their productions. The earth is also divided into several parts, or regions, called ages, or periods. These are the periods, which are distinguished by the nature of the productions, which they contain. The earth is also divided into several parts, or regions, called countries, or provinces. These are the countries, which are distinguished by their government, and the nature of their productions. The earth is also divided into several parts, or regions, called cities, or towns. These are the cities, which are distinguished by their population, and the nature of their productions. The earth is also divided into several parts, or regions, called villages, or hamlets. These are the villages, which are distinguished by their smallness, and the nature of their productions. The earth is also divided into several parts, or regions, called farms, or estates. These are the farms, which are distinguished by the nature of the productions, which they contain. The earth is also divided into several parts, or regions, called fields, or gardens. These are the fields, which are distinguished by the nature of the productions, which they contain. The earth is also divided into several parts, or regions, called woods, or forests. These are the woods, which are distinguished by the nature of the productions, which they contain. The earth is also divided into several parts, or regions, called mountains, or hills. These are the mountains, which are distinguished by their height, and the nature of their productions. The earth is also divided into several parts, or regions, called rivers, or streams. These are the rivers, which are distinguished by the nature of the productions, which they contain. The earth is also divided into several parts, or regions, called lakes, or ponds. These are the lakes, which are distinguished by the nature of the productions, which they contain. The earth is also divided into several parts, or regions, called marshes, or swamps. These are the marshes, which are distinguished by the nature of the productions, which they contain. The earth is also divided into several parts, or regions, called deserts, or wastes. These are the deserts, which are distinguished by the nature of the productions, which they contain. The earth is also divided into several parts, or regions, called mountains, or hills. These are the mountains, which are distinguished by their height, and the nature of their productions. The earth is also divided into several parts, or regions, called rivers, or streams. These are the rivers, which are distinguished by the nature of the productions, which they contain. The earth is also divided into several parts, or regions, called lakes, or ponds. These are the lakes, which are distinguished by the nature of the productions, which they contain. The earth is also divided into several parts, or regions, called marshes, or swamps. These are the marshes, which are distinguished by the nature of the productions, which they contain. The earth is also divided into several parts, or regions, called deserts, or wastes. These are the deserts, which are distinguished by the nature of the productions, which they contain.

Table 4-4

Change in ability to transfer over 6 month period for nursing home residents remaining in the facility, National Health Corporation facilities, 1983

TIME_1	TIME_2			ROW TOTAL	Died or Discharged
	No help	Needs help	Unable		
No help	629	103	16	748 25.1	227 (23.3)
Needs help	161	681	209	1051 35.3	720 (40.6)
Unable	13	162	1002	1177 39.5	672 (36.3)
COLUMN TOTAL	803 27.0	946 31.8	1227 41.2	2976 100.0	1619 (35.2)





Table 4-5

Changes in transferring dependency status over 6-month period for residents  
in National Health Corporation nursing homes, 1983

		<u>Independent to Dependent</u>			<u>Dependent to Independent</u>		
		<u>percent</u>	<u>n</u>	<u>p</u>	<u>percent</u>	<u>n</u>	<u>p</u>
Overall		15.9	(119/748)		7.8	(174/2228)	
1							
Hip Fracture	Yes	18.2	(4/22)		12.2	(19/156)	
	No	15.8	(115/726)	.47	7.5	(155/2053)	.05
1							
Stroke/Plegia	Yes	15.2	(5/33)		4.9	(20/411)	
	No	15.9	(114/715)	.90	8.5	(154/1817)	.02
2							
Clinically Complex	Yes	22.4	(35/156)		7.6	(28/367)	
	No	14.2	(84/592)	.02	7.8	(146/1861)	.97
1							
Congestive Heart Failure	Yes	26.9	(21/78)		9.8	(20/204)	
	No	14.6	(98/67)	.01	7.6	(154/2024)	.33
1							
Confused/ Disoriented	Yes	21.3	(23/108)		3.5	(30/859)	
	No	15.1	(96/634)	.14	12.3	(141/1143)	.00*
1							
Age	<65	7.1	(5/70)		9.9	(23/232)	
	65-89	17.1	(98/574)		8.0	(126/1574)	
	90+	15.4	(16/104)	.10	5.9	(25/422)	.16

\* p < .001

1

Based on ICD-9 code for any of 9 listed diagnoses.

2

RUG-II category which includes residents without severe behavioral problems who have at least one of the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.



Table 4-6

Change in mobility over 6 month period for nursing home residents remaining in the facility,  
National Health Corporation facilities, 1983

TIME_1	TIME_2						ROW TOTAL	Died or Discharged
	Walks	Walks w/ help	Wheels self	Is wheeled	Bedchair fast	Bedfast		
Walks	483	85	20	10	11	1	610 20.5	173 (22.1)
Walks w/ help	101	212	64	64	41	1	483 16.2	396 (45.0)
Wheels self	16	25	368	44	19	6	478 16.1	143 (23.0)
Is wheeled	6	35	76	364	104	18	603 20.3	318 (34.5)
Bedchair fast	5	20	42	114	361	58	600 20.2	370 (38.1)
Bedfast	1	3	10	9	46	133	202 6.8	219 (52.0)
COLUMN TOTAL	612 20.6	380 12.8	580 19.5	605 20.3	582 19.6	217 7.3	2976 100.0	1619 (35.2)



Table 4-7

Changes in mobility dependency status over 6-month period for residents in  
National Health Corporation nursing homes, 1983

		<u>Independent to Dependent</u>			<u>Dependent to Independent</u>		
		<u>percent</u>	<u>n</u>	<u>p</u>	<u>percent</u>	<u>n</u>	<u>p</u>
Overall		18.5	(201/1088)		16.2	(305/1888)	
1							
Hip Fracture	Yes	26.7	(12/45)		28.3	(43/152)	
	No	18.1	(189/1043)	.21	15.1	(262/1736)	.00*
1							
Stroke/Plegia	Yes	19.1	(22/115)		12.2	(40/329)	
	No	18.4	(179/973)	.95	17.0	(265/1559)	.46
2							
Clinically Complex	Yes	18.6	(39/210)		20.4	(64/313)	
	No	18.5	(162/878)	.95	15.3	(241/1575)	.03
1							
Congestive Heart Failure	Yes	22.1	(25/113)		20.1	(34/169)	
	No	18.1	(176/975)	.35	15.8	(271/1719)	.17
1							
Confused/ Disoriented	Yes	23.1	(49/212)		9.0	(68/755)	
	No	17.5	(150/855)	.08	22.2	(236/1063)	.00*
1							
Age	<65	11.1	(13/117)		13.5	(25/185)	
	65-89	19.1	(153/799)		17.0	(230/1349)	
	90+	20.3	(35/172)	.09	14.1	(50/354)	.24

\* p < .001

1

Based on ICD-9 code for any of 9 listed diagnoses.

2

RUG-II category which includes residents without severe behavioral problems who have at least one of the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.



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Table 4-8

Changes in bedfast status over 6-month period for residents in National Health Corporation nursing homes, 1983

		<u>Bedfast to Not Bedfast</u>			<u>Not Bedfast to Bedfast</u>		
		<u>percent</u>	<u>n</u>	<u>p</u>	<u>percent</u>	<u>n</u>	<u>p</u>
Overall		3.0	(84/2774)		34.2	(69/202)	
1							
Hip Fracture	Yes	0.5	(1/184)		38.5	(5/13)	
	No	3.2	(83/2590)	.47	33.9	(64/189)	.02
1							
Stroke/Plegia	Yes	4.3	(17/399)		28.9	(13/45)	
	No	2.8	(67/2375)	.50	35.7	(56/157)	.16
2							
Clinically Complex	Yes	3.4	(17/507)		43.8	(7/16)	
	No	3.0	(67/2267)	.57	33.3	(62/186)	.74
1							
Congestive Heart Failure	Yes	3.8	(10/266)		12.5	(2/16)	
	No	3.0	(74/2508)	.10	36.0	(67/186)	.59
1							
Confused/ Disoriented	Yes	5.5	(47/855)		32.1	(36/112)	
	No	1.9	(35/1851)	.59	37.3	(25/67)	.00*
1							
Age	<65	3.0	(8/270)		34.4	(11/32)	
	65-89	3.3	(66/2013)		34.8	(47/135)	
	90+	2.0	(10/491)	.93	31.4	(11/35)	.35

\* p < .001

1

Based on ICD-9 code for any of 9 listed diagnoses.

2

RUG-II category which includes residents without severe behavioral problems who have at least one of the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.

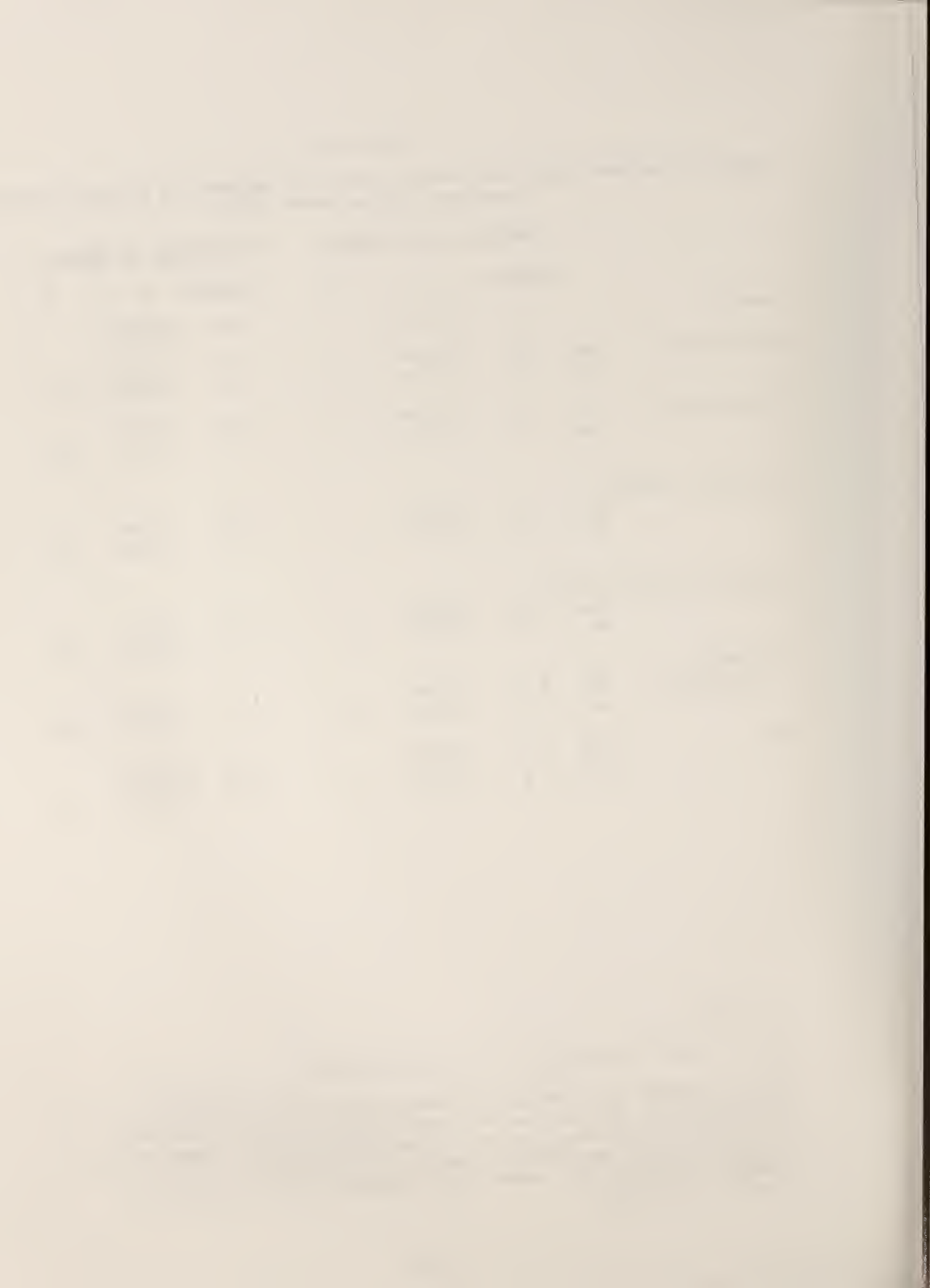


Table 4-9

Change in ability to toilet over 6 month period for nursing home residents remaining in the facility, National Health Corporation facilities, 1983

TIME_1	TIME_2			ROW TOTAL	Died or Discharged
	No help	Needs help	Unable		
No help	574	114	24	712 23.9	222 (23.8)
Needs help	163	566	193	922 31.0	668 (42.0)
Unable	18	154	1170	1342 45.1	729 (35.2)
COLUMN TOTAL	755 25.4	834 28.0	1387 46.6	2976 100.0	1619 (35.2)

THE HISTORY OF THE UNITED STATES OF AMERICA

1776	1777	1778	1779	1780	1781
1782	1783	1784	1785	1786	1787
1788	1789	1790	1791	1792	1793
1794	1795	1796	1797	1798	1799
1800	1801	1802	1803	1804	1805
1806	1807	1808	1809	1810	1811
1812	1813	1814	1815	1816	1817
1818	1819	1820	1821	1822	1823
1824	1825	1826	1827	1828	1829
1830	1831	1832	1833	1834	1835
1836	1837	1838	1839	1840	1841
1842	1843	1844	1845	1846	1847
1848	1849	1850	1851	1852	1853
1854	1855	1856	1857	1858	1859
1860	1861	1862	1863	1864	1865
1866	1867	1868	1869	1870	1871
1872	1873	1874	1875	1876	1877
1878	1879	1880	1881	1882	1883
1884	1885	1886	1887	1888	1889
1890	1891	1892	1893	1894	1895
1896	1897	1898	1899	1900	1901
1902	1903	1904	1905	1906	1907
1908	1909	1910	1911	1912	1913
1914	1915	1916	1917	1918	1919
1920	1921	1922	1923	1924	1925
1926	1927	1928	1929	1930	1931
1932	1933	1934	1935	1936	1937
1938	1939	1940	1941	1942	1943
1944	1945	1946	1947	1948	1949
1950	1951	1952	1953	1954	1955
1956	1957	1958	1959	1960	1961
1962	1963	1964	1965	1966	1967
1968	1969	1970	1971	1972	1973
1974	1975	1976	1977	1978	1979
1980	1981	1982	1983	1984	1985
1986	1987	1988	1989	1990	1991
1992	1993	1994	1995	1996	1997
1998	1999	2000	2001	2002	2003
2004	2005	2006	2007	2008	2009
2010	2011	2012	2013	2014	2015
2016	2017	2018	2019	2020	2021



Table 4-10

Changes in toileting dependency status over 6-month period for results in  
National Health Corporation nursing homes, 1983

		<u>Independent to Dependent</u>			<u>Dependent to Independent</u>		
		<u>percent</u>	<u>n</u>	<u>p</u>	<u>percent</u>	<u>n</u>	<u>p</u>
Overall		19.4	(138/712)		8.0	(181/2264)	
<sup>1</sup>							
Hip Fracture	Yes	8.7	(2/23)		9.8	(17/174)	
	No	19.7	(136/689)	.14	7.8	(164/2090)	.29
<sup>1</sup>							
Stroke/Plegia	Yes	22.5	(9/40)		5.0	(20/404)	
	No	19.2	(129/672)	.76	8.7	(161/1860)	.02
<sup>2</sup>							
Clinically Complex	Yes	24.2	(36/149)		7.8	(29/374)	
	No	18.1	(102/563)	.12	8.0	(152/1890)	.93
<sup>1</sup>							
Diabetes	Yes	23.2	(22/95)		10.7	(35/328)	
	No	18.8	(116/617)	.39	7.5	(146/1936)	.07
Confused/ Disoriented	Yes	27.7	(23/83)		3.2	(28/884)	
	No	18.4	(115/625)	.02	11.6	(150/1293)	.00*
Age	<65	13.7	(10/73)		8.3	(19/229)	
	65-89	20.3	(108/533)		8.5	(137/1615)	
	90+	18.9	(20/106)	.41	6.0	(25/420)	.23
<sup>3</sup>							
ADL(Transfer & Eating)							
	Independent	16.4	(106/648)		42.2	(35/83)	
	Intermediate	49.2	(31/63)		12.5	(129/1030)	
	Dependent	100.0	(1/1)	.00*	1.5	(17/1151)	.00*
Female	Yes	18.1	(89/492)		7.4	(125/1686)	
	No	22.3	(49/220)	.23	9.7	(56/578)	.10

\* p < .001

<sup>1</sup>

Based on ICD-9 code for any of 9 listed diagnoses.

<sup>2</sup>

RUG-II category which includes residents without severe behavioral problems who have at least one of the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.

<sup>3</sup>

Independent means independent (needs no help) in transfer and eating; intermediate means dependent (requires some help, is unable to do, or parentally fed) in either transfer or eating; dependent means dependent in both transfer and eating.

CHAPTER I

The first part of the book is devoted to a general survey of the subject. It begins with a definition of the term "philosophy" and a discussion of its history. The author then proceeds to a discussion of the various branches of philosophy, including metaphysics, epistemology, ethics, and political philosophy. Each branch is treated in a separate chapter, and the author discusses the main theories and problems associated with each. The book is written in a clear and concise style, and it is suitable for both students and scholars. The author's approach is to present the main ideas of each branch in a straightforward manner, without unnecessary technicalities. The book is a valuable introduction to the study of philosophy, and it is highly recommended for anyone who is interested in the subject.

CHAPTER II

The second part of the book is devoted to a more detailed discussion of the various branches of philosophy. It begins with a discussion of metaphysics, which is the study of the nature of reality. The author discusses the main theories of metaphysics, including the theory of forms and the theory of atoms. He then discusses epistemology, which is the study of knowledge. The author discusses the main theories of epistemology, including the theory of rationalism and the theory of empiricism. He then discusses ethics, which is the study of morality. The author discusses the main theories of ethics, including the theory of utilitarianism and the theory of deontology. Finally, he discusses political philosophy, which is the study of the nature of the state and the rights of the citizen. The author discusses the main theories of political philosophy, including the theory of democracy and the theory of authoritarianism. The book is written in a clear and concise style, and it is suitable for both students and scholars. The author's approach is to present the main ideas of each branch in a straightforward manner, without unnecessary technicalities. The book is a valuable introduction to the study of philosophy, and it is highly recommended for anyone who is interested in the subject.

Table 4-11

Change in bladder continence over 6 month period for nursing home residents remaining in the facility, National Health Corporation facilities, 1983

TIME_2		Conti-	Occas.	Inconti-	Indwell	Extern	Ostomy	ROW	Died or
TIME_1		nent	incont.	nent	catheter	catheter		TOTAL	Discharged
Continent		1033	121	63	13	12		1242 41.7	669 (35.0)
Occas. incont.		81	185	78	8	9		361 12.1	190 (34.5)
Incontinent		28	83	665	41	28	1	846 28.4	286 (25.3)
Indwell catheter		28	19	60	269	49	4	429 14.4	432 (50.2)
Extern catheter			4	16	15	53		88 3.0	37 (29.6)
Ostomy		1			2	1	6	10 .3	5 (33.3)
COLUMN TOTAL		1171	412	882	348	152	11	2976	1619
		39.3	13.8	29.6	11.7	5.1	.4	100.0	(35.2)

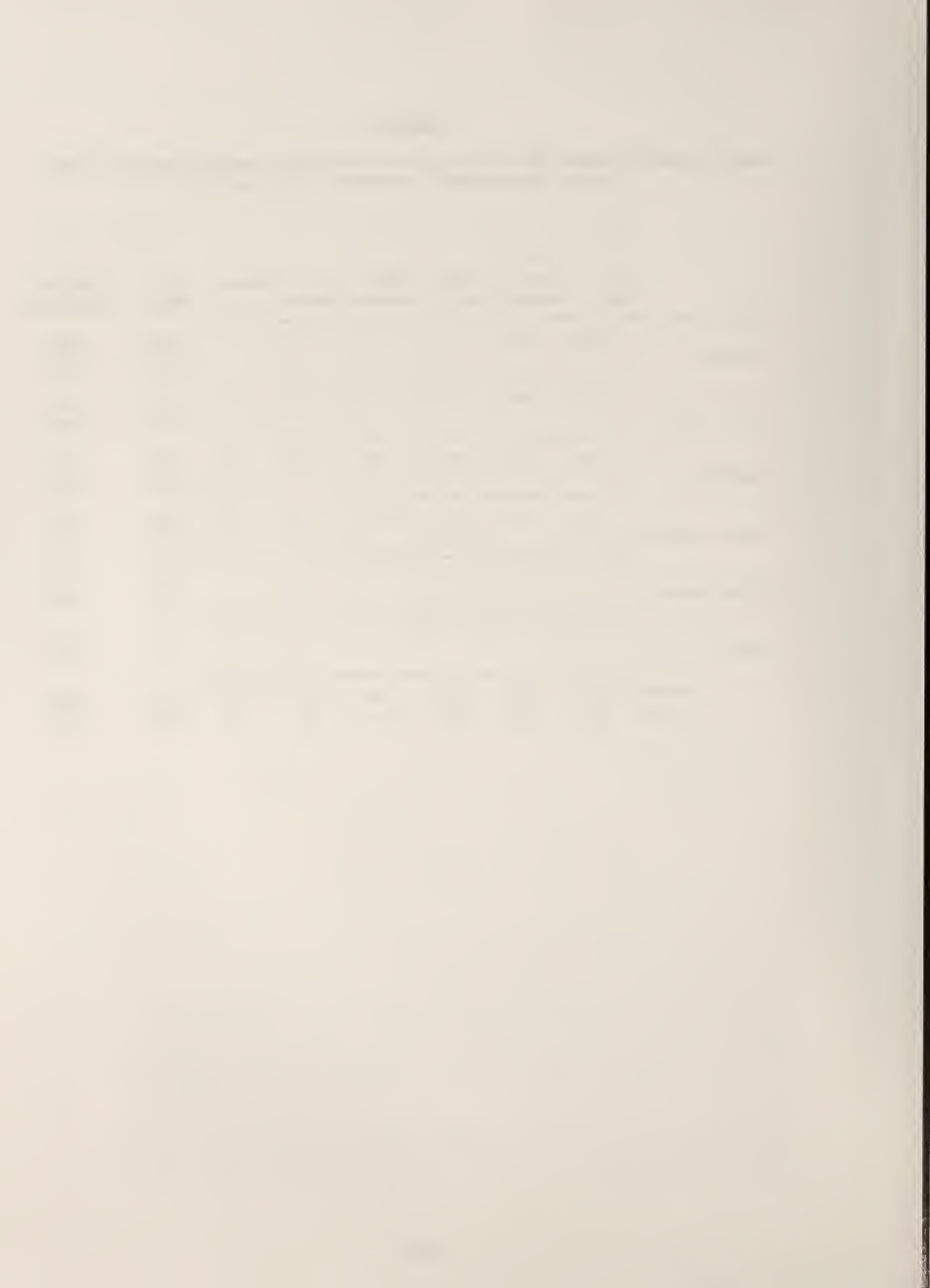


Table 4-12

Changes in bladder continence over 6-month period for residents in National Health Corporation nursing homes, 1983.

		<u>Continent to Incontinent</u>			<u>Incontinent to Continent</u>		
		<u>percent</u>	<u>n</u>	<u>p</u>	<u>percent</u>	<u>n</u>	<u>p</u>
Overall		16.8	(209/1242)		8.0	(138/1734)	
<sup>1</sup>							
Hip Fracture	Yes	21.2	(18/85)		8.0	(9/112)	
	No	16.5	(191/1157)	.33	8.0	(29/1622)	.88
<sup>1</sup>							
Stroke/Plegia	Yes	14.5	(19/131)		5.8	(18/313)	
	No	17.2	(190/1111)	.52	8.4	(120/1421)	.13
<sup>2</sup>							
Clinically Complex	Yes	17.9	(45/252)		7.7	(21/271)	
	No	16.6	(164/990)	.69	8.0	(117/1463)	.98
<sup>1</sup>							
Diabetes	Yes	14.6	(24/164)		10.0	(26/259)	
	No	17.2	(185/1078)	.48	7.6	(112/1475)	.22
Confused/ Disoriented	Yes	29.9	(40/134)		3.5	(29/833)	
	No	15.2	(167/1096)	.00*	13.3	(109/822)	.00*
Age	<65	11.4	(14/123)		7.8	(14/179)	
	65-89	17.4	(161/923)		8.5	(104/1225)	
	90+	17.3	(34/196)	.23	6.1	(20/330)	.35
<sup>3</sup>							
ADL (Transfer & Eating)							
	Independent	12.1	(77/638)		21.5	(20/93)	
	Intermediate	18.6	(93/499)		12.0	(71/594)	
	Dependent	37.1	(39/105)	.00*	4.5	(47/1047)	.00*
Female	Yes	16.2	(146/899)		7.4	(95/1279)	
	No	18.4	(63/343)	.42	9.5	(43/455)	.20

\* p < .001

<sup>1</sup>

Based on ICD-9 code for any of 9 listed diagnoses.

<sup>2</sup>

RUG-II category which includes residents without severe behavioral problems who have at least one of the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.

<sup>3</sup>

Independent means independent (needs no help) in transfer and eating; intermediate means dependent (requires some help, is unable to do, or tube or parenterally fed) in either transfer or eating; dependent means dependent in both transfer and eating.



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for the purchase of ...

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Table 4-13

Change in bowel continence over 6 month period for nursing home residents remaining in the facility, National Health Corporation facilities, 1983

TIME_1	TIME_2				ROW TOTAL	Died or Discharged
	Conti- nent	Occas. incont.	Inconti- nent	Ostomy		
Continent	1196	117	101	3	1417 47.6	785 (35.6)
Occas. incont.	77	146	108		331 11.1	166 (33.4)
Incontinent	61	84	1056	1	1202 40.4	694 (35.1)
Ostomy	2		4	20	26 .9	19 (42.2)
COLUMN TOTAL	1336 44.9	347 11.6	1269 42.6	24 .8	2976 100.0	1619 (35.2)

... ..

Date	To	By	Amount	Balance	Total	Remarks
1890	Jan	1	100	100	100	...
1890	Feb	2	200	300	300	...
1890	Mar	3	300	600	600	...
1890	Apr	4	400	1000	1000	...
1890	May	5	500	1500	1500	...
1890	Jun	6	600	2100	2100	...
1890	Jul	7	700	2800	2800	...
1890	Aug	8	800	3600	3600	...
1890	Sep	9	900	4500	4500	...
1890	Oct	10	1000	5500	5500	...
1890	Nov	11	1100	6600	6600	...
1890	Dec	12	1200	7800	7800	...
1890	Total	12	12000	12000	12000	...

Table 4-14

Changes in bowel continence over 6-month period for residents in National Health Corporation nursing homes, 1983.

		<u>Continent to Incontinent</u>			<u>Incontinent to Continent</u>		
		<u>percent</u>	<u>n</u>	<u>p</u>	<u>percent</u>	<u>n</u>	<u>p</u>
Overall		15.6	(221/1417)		9.0	(140/1559)	
Hip Fracture <sup>1</sup>	Yes	16.2	(16/99)		11.2	(11/98)	
	No	15.6	(205/1318)	.99	8.8	(129/1461)	.54
Stroke/Plegia <sup>1</sup>	Yes	18.2	(28/154)		9.7	(28/290)	
	No	15.3	(193/1263)	.41	8.8	(112/1269)	.74
Clinically Complex <sup>2</sup>	Yes	14.5	(42/289)		6.8	(16/234)	
	No	15.9	(179/1128)	.64	9.4	(124/1325)	.26
Diabetes <sup>1</sup>	Yes	14.4	(28/195)		12.7	(29/228)	
	No	15.8	(193/1222)	.68	8.3	(111/1331)	.04
Confused/ Disoriented	Yes	33.7	(56/166)		4.9	(39/801)	
	No	13.0	(160/1233)	.00*	14.4	(99/685)	.00*
Age	<65	10.0	(13/130)		8.1	(14/172)	
	65-89	16.3	(172/1058)		9.6	(105/1090)	
	90+	15.7	(36/229)	.18	7.1	(21/297)	.23
ADL (Transfer & Feeding) <sup>3</sup>	Independent	7.2	(48/666)		29.2	(19/65)	
	Intermediate	18.9	(114/602)		13.8	(68/491)	
	Dependent	39.6	(59/149)	.00*	5.3	(53/1003)	.00*
Female	Yes	15.4	(160/1038)		8.6	(98/1140)	
	No	16.1	(61/379)	.81	10.0	(42/419)	.43

\* p < .001

1

Based on ICD-9 code for any of 9 listed diagnoses.

2

RUG-II category which includes residents without severe behavioral problems who have at least one of the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.

3

Independent means independent (needs no help) in transfer and eating; intermediate means dependent (requires some help, is unable to do, or tube or parenterally) in either transfer or eating; dependent means dependent in both transfer and eating.

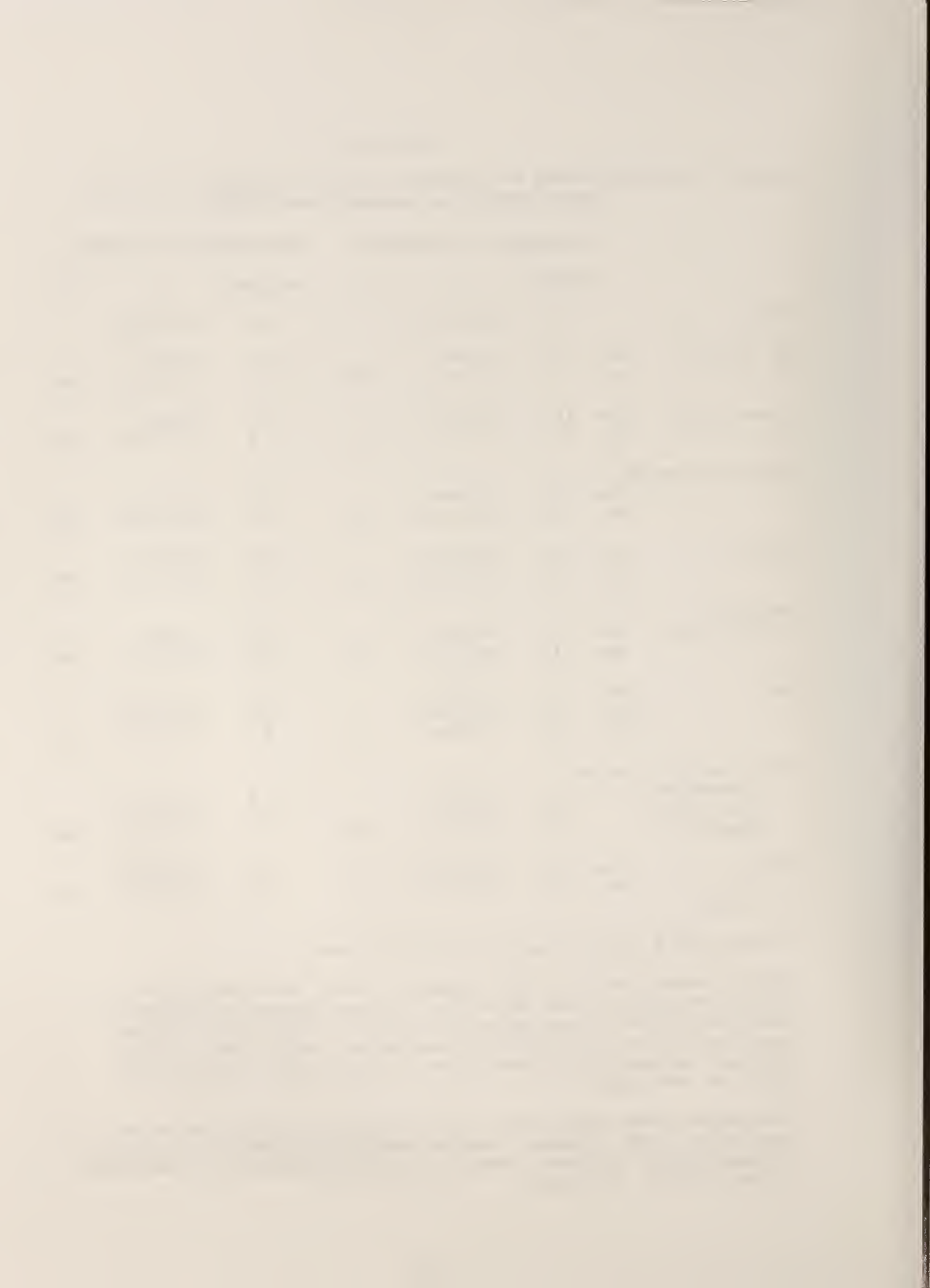




Table 4-15

Prevalence, maintenance, recovery, and incidence of contractures over 6-month period for residents in National Health Corporation nursing homes, 1983

<u>Independent Variable</u>	<u>Prevalence</u>	<u>Maintained</u>	<u>Recovery</u>	<u>Incidence</u>
Overall	2.9 (135/4595)	88.1 (96/109)	11.9 (13/109)	2.1 (60/2867)
1				
Hip Fracture				
Yes	0.0 (0/413)	0.0 (0/0)	0.0 (0/0)	1.5 (3/197)
No	3.2 (135/4182)	88.1 (96/109)	11.9 (13/109)	2.1 (57/2670)
1				
Stroke/Plegia				
Yes	5.5 (37/669)*	89.3 (25/28)	10.7 (3/28)	4.1 (17/416)
No	2.5 (98/3926)	87.7 (71/81)	12.3 (10/81)	1.8 (43/2451)
Comatose				
Yes	5.1 (6/118)	100.0 (2/2)	0.0 (0/2)	6.1 (3/49)
No	2.7 (117/4342)	88.8 (87/98)	11.2 (11/98)	1.9 (53/2736)
2				
Clinically Complex				
Yes	1.9 (15/775)	81.8 (9/11)	18.2 (2/11)	0.6 (3/512)
No	3.1 (120/3820)	88.8 (87/98)	11.2 (11/98)	2.4 (57/2355)
Age				
< 65	6.6 (30/456)*	84.6 (22/26)	15.4 (4/26)	2.5 (7/276)
65-89	2.5 (84/3383)	89.7 (61/68)	10.3 (7/68)	1.9 (40/2080)
90 +	2.8 (21/756)	86.7 (13/15)	13.3 (2/15)	2.5 (13/511)
3				
ADL (Transfer & Eating)				
Independent	0.4 (4/949)*	100.0 (4/4)	0.0 (0/4)	0.3 (2/727)*
Intermediate	1.7 (28/1677)	87.0 (20/23)	13.0 (3/23)	1.1 (12/1070)
Dependent	5.2 (103/1969)	87.8 (72/82)	12.2 (10/82)	4.3 (46/1070)

\*

p < .001

1

Based on ICD-9 code for any of 9 listed diagnoses.

2

RUG-II category which includes residents without severe behavioral problems who have at least one of the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.

3

Independent means independent (needs no help) in transfer and eating; intermediate means dependent (requires some help, is unable to do, or tube or parenterally fed) in either transfer or eating; dependent means dependent in both transfer and eating.

# Table 1

Summary of the results of the analysis of variance for the effect of the treatment on the response variable.

Treatment	Response Variable	Mean	Standard Error	95% CI
Control	Yield (kg/ha)	1.2	0.1	1.0 - 1.4
T1	Yield (kg/ha)	1.5	0.1	1.3 - 1.7
T2	Yield (kg/ha)	1.8	0.1	1.6 - 2.0
T3	Yield (kg/ha)	2.1	0.1	1.9 - 2.3
T4	Yield (kg/ha)	2.4	0.1	2.2 - 2.6
T5	Yield (kg/ha)	2.7	0.1	2.5 - 2.9
T6	Yield (kg/ha)	3.0	0.1	2.8 - 3.2
T7	Yield (kg/ha)	3.3	0.1	3.1 - 3.5
T8	Yield (kg/ha)	3.6	0.1	3.4 - 3.8
T9	Yield (kg/ha)	3.9	0.1	3.7 - 4.1
T10	Yield (kg/ha)	4.2	0.1	4.0 - 4.4
T11	Yield (kg/ha)	4.5	0.1	4.3 - 4.7
T12	Yield (kg/ha)	4.8	0.1	4.6 - 5.0
T13	Yield (kg/ha)	5.1	0.1	4.9 - 5.3
T14	Yield (kg/ha)	5.4	0.1	5.2 - 5.6
T15	Yield (kg/ha)	5.7	0.1	5.5 - 5.9
T16	Yield (kg/ha)	6.0	0.1	5.8 - 6.2
T17	Yield (kg/ha)	6.3	0.1	6.1 - 6.5
T18	Yield (kg/ha)	6.6	0.1	6.4 - 6.8
T19	Yield (kg/ha)	6.9	0.1	6.7 - 7.1
T20	Yield (kg/ha)	7.2	0.1	7.0 - 7.4
T21	Yield (kg/ha)	7.5	0.1	7.3 - 7.7
T22	Yield (kg/ha)	7.8	0.1	7.6 - 8.0
T23	Yield (kg/ha)	8.1	0.1	7.9 - 8.3
T24	Yield (kg/ha)	8.4	0.1	8.2 - 8.6
T25	Yield (kg/ha)	8.7	0.1	8.5 - 8.9
T26	Yield (kg/ha)	9.0	0.1	8.8 - 9.2
T27	Yield (kg/ha)	9.3	0.1	9.1 - 9.5
T28	Yield (kg/ha)	9.6	0.1	9.4 - 9.8
T29	Yield (kg/ha)	9.9	0.1	9.7 - 10.1
T30	Yield (kg/ha)	10.2	0.1	10.0 - 10.4
T31	Yield (kg/ha)	10.5	0.1	10.3 - 10.7
T32	Yield (kg/ha)	10.8	0.1	10.6 - 11.0
T33	Yield (kg/ha)	11.1	0.1	10.9 - 11.3
T34	Yield (kg/ha)	11.4	0.1	11.2 - 11.6
T35	Yield (kg/ha)	11.7	0.1	11.5 - 11.9
T36	Yield (kg/ha)	12.0	0.1	11.8 - 12.2
T37	Yield (kg/ha)	12.3	0.1	12.1 - 12.5
T38	Yield (kg/ha)	12.6	0.1	12.4 - 12.8
T39	Yield (kg/ha)	12.9	0.1	12.7 - 13.1
T40	Yield (kg/ha)	13.2	0.1	13.0 - 13.4
T41	Yield (kg/ha)	13.5	0.1	13.3 - 13.7
T42	Yield (kg/ha)	13.8	0.1	13.6 - 14.0
T43	Yield (kg/ha)	14.1	0.1	13.9 - 14.3
T44	Yield (kg/ha)	14.4	0.1	14.2 - 14.6
T45	Yield (kg/ha)	14.7	0.1	14.5 - 14.9
T46	Yield (kg/ha)	15.0	0.1	14.8 - 15.2
T47	Yield (kg/ha)	15.3	0.1	15.1 - 15.5
T48	Yield (kg/ha)	15.6	0.1	15.4 - 15.8
T49	Yield (kg/ha)	15.9	0.1	15.7 - 16.1
T50	Yield (kg/ha)	16.2	0.1	16.0 - 16.4
T51	Yield (kg/ha)	16.5	0.1	16.3 - 16.7
T52	Yield (kg/ha)	16.8	0.1	16.6 - 17.0
T53	Yield (kg/ha)	17.1	0.1	16.9 - 17.3
T54	Yield (kg/ha)	17.4	0.1	17.2 - 17.6
T55	Yield (kg/ha)	17.7	0.1	17.5 - 17.9
T56	Yield (kg/ha)	18.0	0.1	17.8 - 18.2
T57	Yield (kg/ha)	18.3	0.1	18.1 - 18.5
T58	Yield (kg/ha)	18.6	0.1	18.4 - 18.8
T59	Yield (kg/ha)	18.9	0.1	18.7 - 19.1
T60	Yield (kg/ha)	19.2	0.1	19.0 - 19.4
T61	Yield (kg/ha)	19.5	0.1	19.3 - 19.7
T62	Yield (kg/ha)	19.8	0.1	19.6 - 20.0
T63	Yield (kg/ha)	20.1	0.1	19.9 - 20.3
T64	Yield (kg/ha)	20.4	0.1	20.2 - 20.6
T65	Yield (kg/ha)	20.7	0.1	20.5 - 20.9
T66	Yield (kg/ha)	21.0	0.1	20.8 - 21.2
T67	Yield (kg/ha)	21.3	0.1	21.1 - 21.5
T68	Yield (kg/ha)	21.6	0.1	21.4 - 21.8
T69	Yield (kg/ha)	21.9	0.1	21.7 - 22.1
T70	Yield (kg/ha)	22.2	0.1	22.0 - 22.4
T71	Yield (kg/ha)	22.5	0.1	22.3 - 22.7
T72	Yield (kg/ha)	22.8	0.1	22.6 - 23.0
T73	Yield (kg/ha)	23.1	0.1	22.9 - 23.3
T74	Yield (kg/ha)	23.4	0.1	23.2 - 23.6
T75	Yield (kg/ha)	23.7	0.1	23.5 - 23.9
T76	Yield (kg/ha)	24.0	0.1	23.8 - 24.2
T77	Yield (kg/ha)	24.3	0.1	24.1 - 24.5
T78	Yield (kg/ha)	24.6	0.1	24.4 - 24.8
T79	Yield (kg/ha)	24.9	0.1	24.7 - 25.1
T80	Yield (kg/ha)	25.2	0.1	25.0 - 25.4
T81	Yield (kg/ha)	25.5	0.1	25.3 - 25.7
T82	Yield (kg/ha)	25.8	0.1	25.6 - 26.0
T83	Yield (kg/ha)	26.1	0.1	25.9 - 26.3
T84	Yield (kg/ha)	26.4	0.1	26.2 - 26.6
T85	Yield (kg/ha)	26.7	0.1	26.5 - 26.9
T86	Yield (kg/ha)	27.0	0.1	26.8 - 27.2
T87	Yield (kg/ha)	27.3	0.1	27.1 - 27.5
T88	Yield (kg/ha)	27.6	0.1	27.4 - 27.8
T89	Yield (kg/ha)	27.9	0.1	27.7 - 28.1
T90	Yield (kg/ha)	28.2	0.1	28.0 - 28.4
T91	Yield (kg/ha)	28.5	0.1	28.3 - 28.7
T92	Yield (kg/ha)	28.8	0.1	28.6 - 29.0
T93	Yield (kg/ha)	29.1	0.1	28.9 - 29.3
T94	Yield (kg/ha)	29.4	0.1	29.2 - 29.6
T95	Yield (kg/ha)	29.7	0.1	29.5 - 29.9
T96	Yield (kg/ha)	30.0	0.1	29.8 - 30.2
T97	Yield (kg/ha)	30.3	0.1	30.1 - 30.5
T98	Yield (kg/ha)	30.6	0.1	30.4 - 30.8
T99	Yield (kg/ha)	30.9	0.1	30.7 - 31.1
T100	Yield (kg/ha)	31.2	0.1	31.0 - 31.4

Figure 1: A line graph showing the trend of the response variable over time for different treatments. The x-axis represents time (days) and the y-axis represents the response variable (kg/ha). The graph shows that the response variable increases over time for all treatments, with the rate of increase being higher for treatments with higher initial values.

Table 4-16

Prevalence, maintenance, recovery, and incidence of decubitus ulcers over 6-month period for residents in National Health Corporation nursing homes, 1983

<u>Independent Variable</u>	<u>Prevalence</u>	<u>Maintained</u>	<u>Recovery</u>	<u>Incidence</u>
Overall	15.6 (715/4595)	54.4 (191/351)	45.6 (160/351)	6.0 (157/2625)
1				
Hip Fracture				
Yes	18.6 (77/413)	48.7 (19/39)	51.3 (20/39)	7.6 (12/158)
No	15.3 (638/4182)	55.1 (172/312)	44.9 (140/312)	5.9 (145/2467)
1				
Stroke/Plegia				
Yes	20.9 (140/669)*	63.5 (47/74)	36.5 (27/74)	6.5 (24/370)
No	14.6 (575/3926)	50.2 (134/267)	49.8 (133/267)	6.3 (143/2265)
Comatose				
Yes	44.1 (52/118)*	75.0 (9/12)*	25.0 (3/12)*	2.8 (5/39)
No	14.3 (620/4342)	54.0 (175/324)	46.0 (149/324)	5.7 (142/2510)
2				
Clinically Complex				
Yes	10.2 (79/775)*	51.3 (20/39)	48.7 (19/39)	4.3 (21/484)
No	16.6 (636/3820)	54.8 (171/312)	45.2 (141/312)	6.4 (136/2141)
Age				
< 65	14.9 (68/456)*	67.6 (25/37)	32.4 (12/37)	6.8 (18/265)
65-89	16.3 (551/3383)	66.9 (251/375)	33.1 (124/375)	5.8 (109/1882)
90 +	12.7 (96/756)	50.0 (24/48)	50.0 (24/48)	6.3 (30/478)
3				
ADL (Transfer & Eating)				
Independent	2.6 (25/949)*	60.0 (9/15)	40.0 (6/15)	2.1 (15/716)*
Intermediate	9.9 (166/1677)	42.4 (39/92)	57.6 (53/92)	4.7 (47/1001)
Dependent	26.6 (524/1969)	58.6 (143/244)	41.4 (101/244)	10.5 (95/908)
1				
Diabetes				
Yes	20.9 (137/654)*	60.6 (43/71)	39.6 (28/71)	8.5 (30/352)
No	14.7 (578/3941)	52.9 (148/280)	47.1 (132/280)	5.6 (127/2273)
1				
CHF				
Yes	15.7 (644/4113)	55.1 (173/323)	44.9 (145/323)	5.9 (139/2377)
No	14.7 (71/482)	46.4 (13/28)	53.6 (15/28)	7.1 (18/254)

\*

p < .001

1

Based on ICD-9 code for any of 9 listed diagnoses.

2

RUG-II category which includes residents without severe behavioral problems who have at least one of the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.

3

Independent means independent (needs no help) in transfer and eating; intermediate means dependent (requires some help, is unable to do, or tube or parenterally fed) in either transfer or eating; dependent means dependent in both transfer and eating.



Table 4-17

Prevalence, maintenance, recovery, and incidence of urinary tract infection over 6-month period  
for residents in National Health Corporation nursing homes, 1983

<u>Independent Variable</u>	<u>Prevalence</u>	<u>Maintained</u>	<u>Recovery</u>	<u>Incidence</u>
Overall	8.0 (366/4595)	83.5 (202/242)	16.5 (40/242)	1.7 (47/2734)
1				
Hip Fracture				
Yes	4.8 (20/413)	92.3 (12/13)	7.7 (1/13)	2.7 (5/184)
No	8.3 (346/4182)	83.0 (190/229)	17.0 (39/229)	1.6 (42/2550)
1				
Stroke/Plegia				
Yes	8.8 (59/669)	84.4 (38/45)	15.6 (7/45)	2.3 (9/399)
No	7.8 (307/3926)	83.2 (164/197)	16.8 (33/197)	1.6 (38/2335)
Comatose				
Yes	13.6 (16/118)	83.3 (5/6)	16.7 (1/6)	0.0 (0/45)
No	7.6 (331/4342)	83.6 (189/226)	16.4 (37/226)	1.7 (44/2608)
Age				
< 65	8.1 (37/456)	88.0 (22/25)	12.0 (3/25)	2.2 (6/277)
65-89	7.6 (257/3383)	81.4 (140/172)	18.6 (32/172)	1.6 (32/1976)
90 +	9.5 (72/756)	88.9 (40/45)	11.1 (5/45)	1.9 (9/481)
2				
ADL (Transfer & Eating)				
Independent	3.7 (35/949)*	82.1 (23/28)	17.9 (5/28)	0.6 (4/703)*
Intermediate	7.2 (120/1677)	78.2 (68/87)	21.8 (19/87)	0.7 (7/1006)
Dependent	10.7 (211/1969)	87.4 (111/127)	12.6 (16/127)	3.5 (36/1025)
1				
Diabetes				
Yes	8.3 (54/654)	82.1 (32/39)	17.9 (7/39)	2.1 (8/384)
No	7.9 (312/3941)	83.7 (170/203)	16.3 (33/203)	1.7 (39/2350)
Catheter				
Yes	15.5 (153/986)*	82.2 (74/90)	17.8 (16/90)	4.9 (21/427)*
No	5.9 (213/3609)	84.2 (128/152)	15.8 (24/152)	1.1 (26/2307)
Female				
Yes	7.8 (249/3186)	84.4 (146/173)	15.6 (27/173)	1.5 (30/2005)
No	8.3 (117/1409)	81.1 (56/69)	18.8 (13/69)	2.3 (17/729)

\*

p < .001

1

Based on ICD-9 code for any of 9 listed diagnoses.

2

Independent means independent (needs no help) in transfer and eating; intermediate means dependent (requires some help, is unable to do, or tube or parenterally fed) in either transfer or eating; dependent means dependent in both transfer and eating.





Table 4-18

Prevalence, maintenance, discontinuation, and incidence of bladder/bowel training over 6-month period for residents in National Health Corporation nursing homes, 1983

<u>Independent Variable</u>	<u>Prevalence</u>	<u>Maintained</u>	<u>Discontinued</u>	<u>Incidence</u>
Overall	14.4 (661/4595)	50.2 (163/325)	49.8 (162/325)	5.2 (138/2651)
1				
Hip Fracture				
Yes	16.0 (66/413)	50.0 (18/36)	50.0 (18/36)	7.5 (12/161)
No	14.2 (595/4182)	50.2 (145/289)	49.8 (144/289)	5.1 (126/2490)
1				
Stroke/Plegia				
Yes	17.5 (117/669)	63.9 (39/61)	36.1 (22/61)	3.9 (15/383)
No	13.9 (544/3926)	46.7 (124/264)	53.3 (140/264)	5.4 (123/2268)
2				
Confused/Disoriented				
Yes	19.5 (276/1412)*	52.7 (79/150)	47.3 (71/150)	9.1 (74/817)*
No	11.3 (345/3048)	48.4 (78/161)	51.6 (83/161)	3.4 (60/1757)
Age				
< 65	13.6 (62/456)	65.6 (21/32)	34.4 (11/32)	6.3 (17/270)
65-89	14.9 (505/3383)	48.4 (122/252)	51.6 (130/252)	5.0 (95/1896)
90 +	12.4 (94/756)	48.8 (20/41)	51.2 (21/41)	5.4 (26/485)
3				
ADL (Transfer & Eating)				
Independent	2.5 (24/949)*	50.0 (8/16)	50.0 (8/16)	1.7 (12/715)*
Intermediate	8.5 (143/1677)	41.8 (33/79)	58.2 (46/79)	3.8 (39/1014)
Dependent	25.1 (494/1969)	53.0 (122/230)	47.0 (108/230)	9.4 (87/922)

\*

p < .001

1

Based on ICD-9 code for any of 9 listed diagnoses.

2

Based on nursing home staff's judgement as to resident's orientation to time, place, person.

3

Independent means independent (needs no help) in transfer and eating; intermediate means dependent (requires some help, is unable to do, or tube or parenterally fed) in either transfer or eating; dependent means dependent in both transfer and eating.

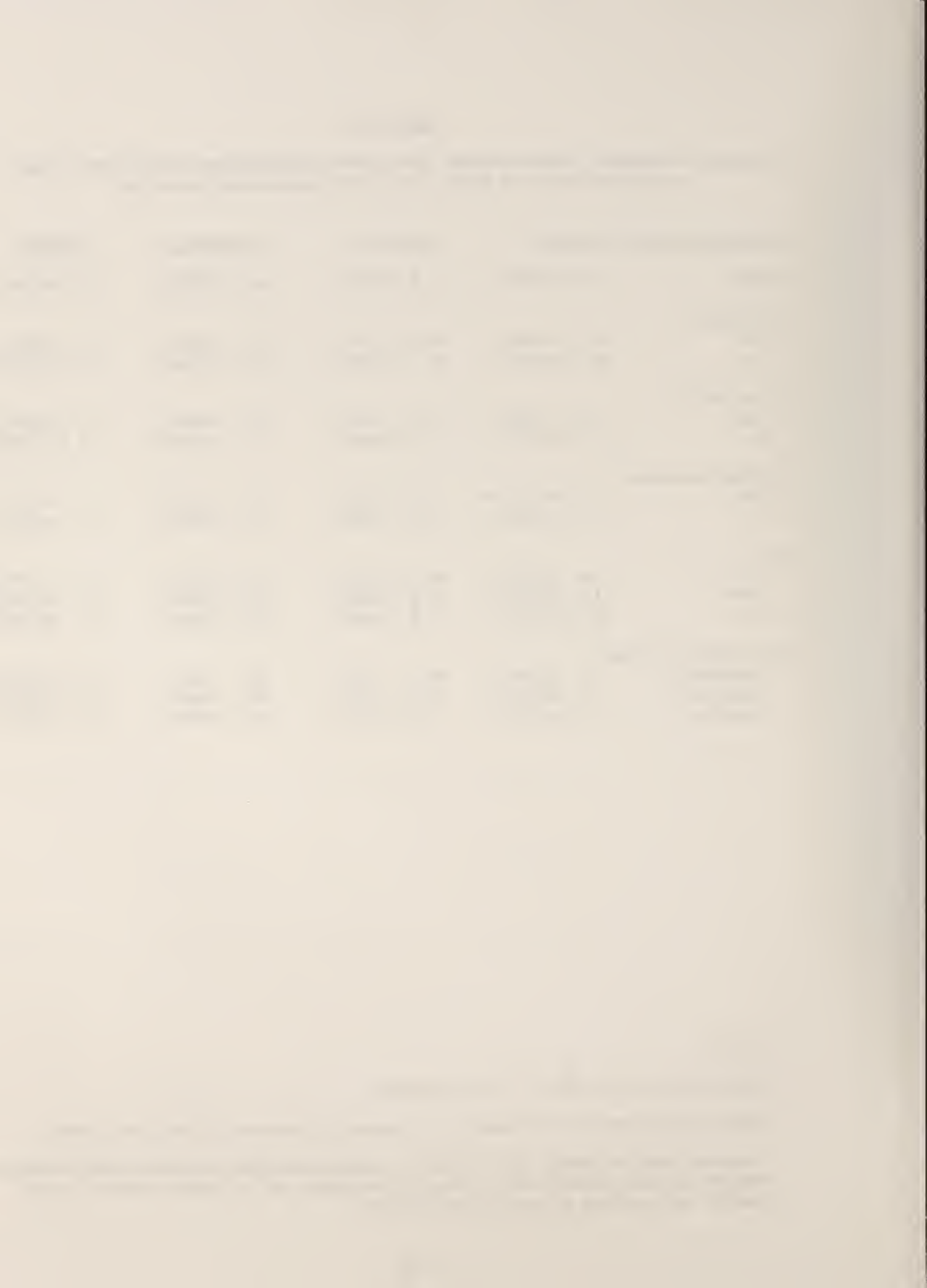


Table 4-19

Prevalence, maintenance, discontinuation, and incidence of use of safety restraints over 6-month period for residents in National Health Corporation nursing homes, 1983

<u>Independent Variable</u>	<u>Prevalence</u>	<u>Maintained</u>	<u>Discontinued</u>	<u>Incidence</u>
Overall	47.2 (2168/4595)	85.2 (1220/1432)	14.8 (212/1432)	15.5 (239/1544)
1				
Hip Fracture				
Yes	48.2 (199/413)	85.6 (95/111)	14.4 (16/111)	27.9 (24/86)
No	47.1 (1969/4182)	85.2 (1125/1321)	14.8 (196/1321)	14.7 (215/1453)
1				
Diabetes				
Yes	45.1 (295/654)	86.8 (165/190)	13.2 (25/190)	14.2 (33/233)
No	47.5 (1873/3941)	84.9 (1055/1242)	15.1 (187/1242)	15.7 (206/1311)
2				
Confused/Disoriented				
Yes	69.4 (980/1412)*	88.8 (611/688)*	11.2 (77/688)*	27.6 (77/279)*
No	35.8 (1092/3048)	80.9 (549/679)	19.1 (130/679)	12.0 (149/1239)
Age				
< 65	43.0 (196/456)*	85.0 (119/140)	15.0 (21/140)	13.0 (21/162)
65-89	46.4 (1570/3383)	83.6 (854/1021)	16.4 (167/1021)	15.6 (176/1127)
90 +	53.2 (402/756)	91.1 (247/271)	8.9 *(24/271)	16.5 (42/255)
3				
ADL (Transfer & Eating)				
Independent	9.5 (90/949)*	58.5 (38/65)*	41.5 (27/65)*	8.6 (57/666)*
Intermediate	43.9 (737/1677)	86.8 (538/620)	13.2 (82/620)	17.0 (97/570)
Dependent	68.1 (1341/1969)	87.8 (741/844)	12.2 (103/844)	27.6 (85/308)

\*

p < .001

1

Based on ICD-9 code for any of 9 listed diagnoses.

2

Based on nursing home staff's judgement as to resident's orientation to time, place, person.

3

Independent means independent (needs no help) in transfer and eating; intermediate means dependent (requires some help, is unable to do, or tube or parenterally fed) in either transfer or eating; dependent means dependent in both transfer and eating.





Table 4-20

Prevalence, maintenance, discontinuation, and incidence of use of control restraints over 6-month period for residents in National Health Corporation nursing homes, 1983

<u>Independent Variable</u>	<u>Prevalence</u>	<u>Maintained</u>	<u>Discontinued</u>	<u>Incidence</u>
Overall	10.2 (469/4595)	53.4 (155/290)	46.6 (135/290)	4.7 (127/2686)
1				
Hip Fracture				
Yes	9.0 (37/413)	70.0 (14/20)	30.0 (6/20)	5.6 (10/177)
No	10.3 (432/4182)	52.2 (141/270)	47.8 (129/270)	4.7 (117/2509)
1				
Diabetes				
Yes	11.0 (72/654)	40.0 (18/45)	60.0 (27/45)	4.2 (16/378)
No	10.1 (397/3941)	55.9 (137/245)	44.1 (108/245)	4.8 (111/2308)
2				
Confused/Disoriented				
Yes	17.6 (249/1412)*	63.7 (100/157)*	36.3 (57/157)*	7.2 (58/810)*
No	6.8 (206/3048)	43.2 (54/125)	56.8 (71/125)	3.7 (67/1793)
Age				
< 65	11.4 (52/456)	50.0 (19/38)	50.0 (19/38)	3.8 (10/264)
65-89	10.2 (346/3383)	52.4 (111/212)	47.6 (101/212)	4.8 (92/1936)
90 +	9.4 (71/756)	62.5 (25/40)	37.5 (15/40)	5.1 (25/486)
3				
ADL (Transfer & Eating)				
Independent	5.5 (52/949)*	53.8 (21/39)	46.2 (18/39)	3.8 (26/692)
Intermediate	9.0 (151/1677)	51.0 (52/102)	49.0 (50/102)	4.1 (41/991)
Dependent	13.5 (266/1969)	55.0 (82/149)	45.0 (67/149)	6.0 (60/1003)

\*

p < .001

1

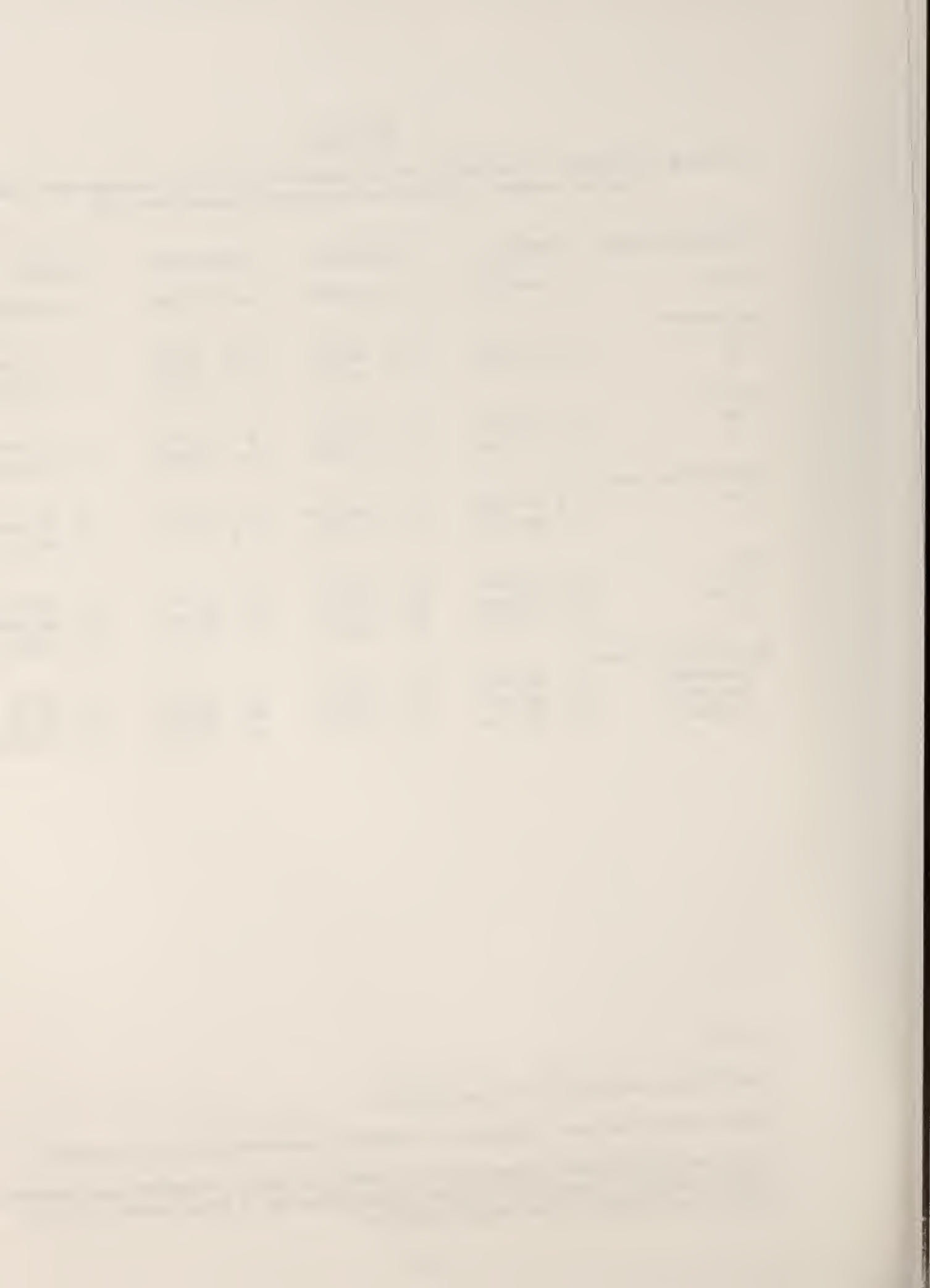
Based on ICD-9 code for any of 9 listed diagnoses.

2

Based on nursing home staff's judgement as to resident's orientation to time, place, person.

3

Independent means independent (needs no help) in transfer and eating; intermediate means dependent (requires some help, is unable to do, or tube or parenterally fed) in either transfer or eating; dependent means dependent in both transfer and eating.



## CHAPTER 5

### ANALYSIS OF NEW YORK STATE NURSING HOME RESIDENT OUTCOMES

#### Methods

##### Data collection system

Semi-annually, each nursing home in New York State assesses all its residents; this process produces a statewide total of about 100,000 assessments annually. The PRI assessments are performed at each facility by staff members who are trained and certified in the assessment process. Depending on the size of the facility, there are between two and five staff members at each facility who are responsible for completing the assessments. This assessment system was first implemented in May 1985, and was used for rate establishment beginning January 1, 1986.

The primary purpose of this data collection is the generation of Resource Utilization Groups (RUG-II) for case-mix adjustment of rate-setting, although the data are also used for utilization review and for research purposes. Information collected on the Patient Review Instrument (PRI) includes administrative data, services required and services provided, ADL information, physician services, and behavioral assessments. A copy of the PRI data collection form is included in Appendix A.

##### Development of analytic files

###### Sampling

Staff from the Brown University Case-Mix Project requested from the New York State Department of Health patient assessments from a 20 percent random sample of all nursing homes in the state. We requested that these data include a minimum of three assessments from each of these facilities. It was estimated that this sample would consist of data from approximately 110 facilities.

In October 1987, we received a data tape which contained three assessments (one from May 1985 and two from 1986) for a 20 percent random sample of nursing homes in New York State. Each of the 111 facilities in this sample submitted data on all residents at three points in time: in May 1985, during the first half of 1986, and again at a six-month interval following the second assessment. In this data set, a facility that has both skilled care (SNF) and intermediate care (ICF), known in New York State as Health Related Facilities (HRF), residents is counted as two distinct facilities. Using the May 1985 data, 25 percent of the facilities had less than 50 residents, 38 percent had between 50-99 residents, 30 percent had between 100-199 residents and 7 percent had a census of 200 or more.

###### Construction of the analytic file

The analytic file was constructed from these data according to the following procedures. The first assessment in 1986 was considered the Time 1 measure. The date of this first assessment varies by facility, as each facility was assessed according to a different schedule. Each resident who was

THE HISTORY OF THE UNITED STATES OF AMERICA  
FROM 1776 TO 1876

The first part of the book deals with the early history of the United States, from the discovery of the continent by Christopher Columbus in 1492 to the establishment of the first colonies. It covers the period of the early exploration, the settlement of the eastern coast, and the development of the plantation system in the South. The second part of the book deals with the period of the American Revolution, from 1776 to 1783. It covers the struggle for independence, the signing of the Declaration of Independence, and the fighting of the Revolutionary War. The third part of the book deals with the period of the early republic, from 1783 to 1800. It covers the establishment of the federal government, the signing of the Constitution, and the early years of the republic. The fourth part of the book deals with the period of the Louisiana Purchase, from 1800 to 1803. It covers the acquisition of the Louisiana Territory and the expansion of the United States. The fifth part of the book deals with the period of the Missouri Compromise, from 1803 to 1820. It covers the admission of Missouri as a slave state and the establishment of the Missouri Compromise line. The sixth part of the book deals with the period of the Mexican War, from 1820 to 1848. It covers the acquisition of California and the establishment of the Mexican War. The seventh part of the book deals with the period of the Texas Revolution, from 1835 to 1845. It covers the establishment of the Texas Republic and the annexation of Texas by the United States. The eighth part of the book deals with the period of the California Gold Rush, from 1848 to 1855. It covers the discovery of gold in California and the influx of settlers. The ninth part of the book deals with the period of the Civil War, from 1861 to 1865. It covers the outbreak of the war, the fighting, and the end of the war. The tenth part of the book deals with the period of Reconstruction, from 1865 to 1876. It covers the Reconstruction of the South and the establishment of the Reconstruction era.

The book is written in a clear and concise style, and it provides a comprehensive overview of the history of the United States. It is a valuable resource for students and scholars alike. The book is divided into ten parts, each dealing with a different period of American history. The first part covers the early history of the United States, from the discovery of the continent to the establishment of the first colonies. The second part covers the American Revolution, from 1776 to 1783. The third part covers the early republic, from 1783 to 1800. The fourth part covers the Louisiana Purchase, from 1800 to 1803. The fifth part covers the Missouri Compromise, from 1803 to 1820. The sixth part covers the Mexican War, from 1820 to 1848. The seventh part covers the Texas Revolution, from 1835 to 1845. The eighth part covers the California Gold Rush, from 1848 to 1855. The ninth part covers the Civil War, from 1861 to 1865. The tenth part covers Reconstruction, from 1865 to 1876. The book is a comprehensive overview of the history of the United States, and it is a valuable resource for students and scholars alike.

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in one of the sampled facilities on the date of the Time 1 assessment was included in the sample file. There are 11,795 residents with Time 1 measurements in this file.

All facilities have a second assessment in 1986, six months after the Time 1 measure. These Time 2 assessments were scanned for records for those residents who had been included in the sample file at Time 1. Not all residents who had been in a nursing home at Time 1 were still in the facility at Time 2. Of the 11,795 residents with a Time 1 record, 9,486 (80.4%) have a Time 2 record 6 months later. The other 2,309 (19.6%) residents died or were discharged before the second round of assessments took place. There is no further information on the discharge disposition of these residents. Thus, each resident has either 1 or 2 records in the file. If there are two records for a resident, as there are for 80.4 percent of the residents in the analytic file, they are six months apart. For the remaining 19.6 percent of this file, there is only one record, and the resident is considered gone from the facility by Time 2.

#### Examination for bias in sampling

The New York State Department of Health selected a 20 percent random sample of nursing homes in the state, and sent us assessment data on all residents in these facilities. Assessments at two points in time for all of these residents were included in the analyses. Although it is possible that the randomization process used in the selection of the 20 percent sample was not effective, it was not possible for us to assess the degree of randomness.

#### Variable selection and construction

As in the analyses of all the data sets, the following were the dependent variables required from the New York data: feeding, transfer, mobility, toileting, contractures, decubitus, urinary tract infections, bladder/bowel training, and restraints. The items necessary for use as independent variables were the following: hip fracture, stroke/plegia, comatose, RUG-II clinically complex, diabetes, congestive heart failure, RUG-II, mental status, age, ADL summary, catheter, and sex. More detail on the approach used in selecting and constructing these variables is presented in Chapter 3.

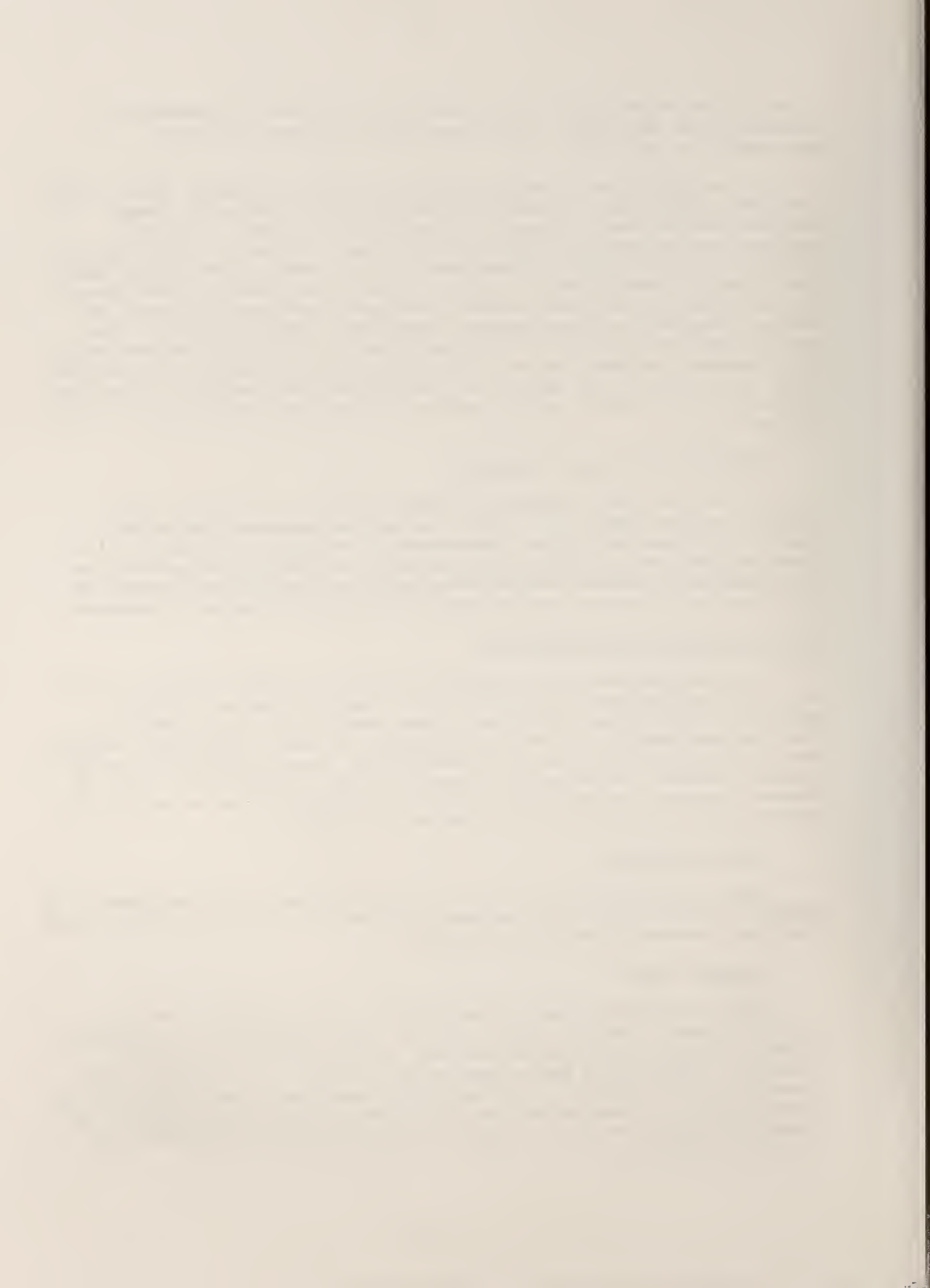
#### Missing variables

There is no mental status item on the New York assessment instrument. The analyses planned based on the confused/disoriented vs. not confused/disoriented dichotomy consequently were not performed.

#### Diagnosis codes

Three new variables were created from the single diagnosis ("Primary Problem") item. This item records the ICD-9 code representing the resident's primary diagnosis. These codes were used to identify residents with hip fractures, stroke/plegia and congestive heart disease. It is expected that identifying the presence of these conditions using the primary diagnosis item would result in an underestimation of the prevalence of these conditions, as they will only be recorded for those residents for whom they represent the primary diagnosis.





### Recoded and combined items

An additional category was added to the toileting variable so that it would include information on those residents who were catheterized. The assessment instrument contains an item which indicates whether or not a resident is catheterized (yes/no). This item was combined with the toileting variable as follows: For those residents who were catheterized, they were scored on the toileting variable in a new category (6=catheterized), replacing their original score on the toileting variable. For those residents who were not catheterized, their original toileting score was retained. The toileting variable was then coded as follows:

1. Continent; requires no supervision
2. Continent; requires intermittent supervision, minor assistance
3. Continent; requires constant supervision, major assistance
4. Incontinent, not taken to bathroom
5. Incontinent, taken to bathroom
6. Catheterized.

The three-level ADL summary score was computed from the transfer and eating items. The most independent category includes those residents who were independent on both the transfer and eating variables, with responses 1 (no supervision) and 2 (with intermittent supervision) considered independent. The most dependent category includes those residents who were dependent in both transfer and eating, with responses 3, 4, and 5 (constant guidance/assistance in transferring, assistance of two people in transferring, cannot/is not gotten out of bed and continual help with eating, totally fed by hand, tube fed, respectively) considered dependent. The intermediate category includes those residents who do not fit into either of the other categories.

Some of the variables chosen for analysis were among those added to the assessment form when it was updated in March 1986. These new items have missing values for those residents whose Time 1 assessments were performed in January or February 1986 using the earlier version of the assessment instrument. The items added to the instrument which are relevant to this investigation are: contractures, diabetes, urinary tract infection, bladder/bowel rehabilitation, catheter, and physical restraints. Analyses related to these items were performed using only residents who were not missing the item.

### Demographic characteristics of the New York State nursing home sample

The majority (79.2%) of the 11,795 residents were covered by Medicaid; 2.3 percent were covered by Medicare, with the remaining 18.5 percent falling in the residual "other" payment source category (See Table 5-1). Almost half of the sample was 85 years of age or over, while one third of the residents were 75-84 years of age. Slightly more than three-quarters of the sample was female.

Nearly three-fourths (72.7%) of the sample had a length of stay at the time of first assessment in this file of greater than one year. About one fifth of the sample's length of stay was between 91 days and one year. The remaining 8.2 percent of the sample had been in the nursing home for 90 days or less.



Additional characteristics of the population at Time 1 are also presented in Table 5-1. These characteristics, their definitions and the results of their analyses follow.

### Change in Physical Functioning

This section describes the initial physical functioning status and change in ability to perform activities of daily living for New York State nursing home residents. As discussed in Chapter 3, change was measured six months after the initial assessment; percentages used in describing change are based on residents who remained in the facility. Activities examined include feeding ability, ability to transfer, mobility, and toileting. Stratified analyses to examine the association between individual activities and covariates are presented for dependency and independence transitions for eating, transfer, bedfast and mobility.

#### Feeding

New York defines feeding as the "process of getting food by any means from the receptacle into the body (for example, plate, cup, tube)." The PRI lists five options for the assessment of feeding status, which we have abbreviated in the tables to 1) Feeds self; 2) Req. some help; 3) Continual help; 4) Fed by hand; and 5) Tube fed. Assessments are coded as how the task was completed 60 percent of the time during the previous four weeks or since admission, whichever is shorter.

The first feeding category, which we have abbreviated to "Feeds self," includes residents who feed themselves without supervision or physical assistance, although adaptive equipment may be used. The second category, "Intermittent supervision," is defined as requiring "intermittent supervision (that is, verbal encouragement/guidance) and/or minimal physical assistance with minor parts of eating, such as cutting food, buttering bread, or opening milk cartons." Residents in these two categories were considered independent in eating.

The third category, "Continual help," refers to the need for encouragement, teaching, or physical assistance without which the meal would not be completed. This means that the patient requires a staff person's continual presence and help for reasons such as: patient tends to choke, has a swallowing problem, is learning to feed self, or is quite confused and forgets to eat. The "Fed by hand" category is used for residents who do not manually participate in feeding. The final category, "Tube fed," refers to residents who are tube or parenterally fed as their primary intake of food. All food and drink, not just supplemental nutrition, is given by nursing staff through the means specified. Residents in these three categories were considered dependent in eating.

#### Initial distribution

Ten percent of the residents could feed themselves with no additional assistance at the time of the first assessment. An additional 48 percent required only intermittent staff supervision or minimal assistance with feeding. Nearly half the residents were dependent; 16 percent required continual help, and an additional 22 percent of the residents were completely fed by hand. Four and one half percent of residents in this population were tube or parenterally



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fed (See Table 5-1).

### Discharges

Nearly 20 percent of the residents were no longer in the facility six months after their initial assessment. The discharge rate (which includes deaths in the facility) was highest among the tube fed group (See Table 5-2). Of those who were tube fed, 34.2 percent were no longer in the facility 6 months later.

### Change in feeding ability

Almost three quarters of the residents remaining in the facility were at the same level feeding ability after six months (See Table 5-2). For residents who underwent a change, about twice as many declined in functional performance as improved. In all, most residents (84.7%) whose eat/feed status changed, changed by only one level.

The most stable groups were those who were tube fed and those who were fed by hand. For residents who were tube fed and were not discharged, 90.8 percent of them were still tube fed six months later. Of those who were fed by hand, 87.6 were still fed by hand after six months.

The least stable groups were those in the "continual help" category and the "feeds self" group. Of those needing continual help at the time of the first assessment, 52.1 percent of those still remaining in the facility stayed in that category. From this group approximately equal numbers improved as declined. Of those who fed themselves without assistance, 58.3 percent still didn't need help six months later, most of whom required "some help."

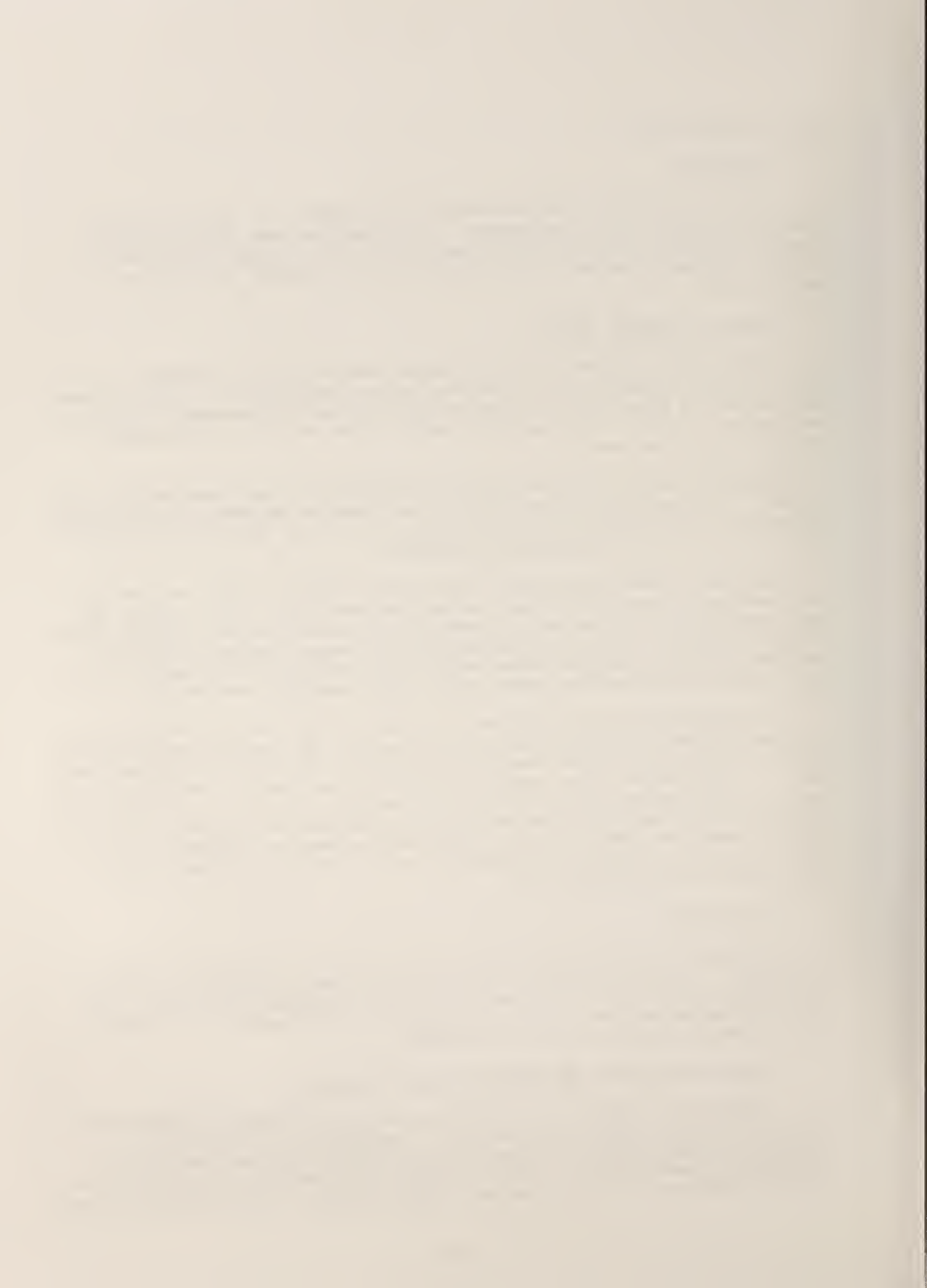
For residents who did experience a change in their ability to feed, the strongest pattern of movement was the 37.6 percent of those who were initially in the "feeds self" category who were later in the category of requiring "some help." Individuals in the "some help" category who changed functional level were four times more likely to decline to needing continual help or being fed by hand than to improve to needing no help. Approximately 15 percent of those able to feed (the "feeds self" and "some help" categories combined) were not able to feed in six months. Conversely, about 11 percent of those unable to feed could feed six months later.

### Tube feeding

Residents who were tube fed made up 4.4 percent of the initial total population. Of those tube fed at Time 1, 90.8 percent of those still in the facility at Time 2 were still tube fed. Only 31 residents (9.2%) had their tube feeding discontinued, while tube feeding was initiated on 132 residents for a 6-month incidence rate of 1.5 percent.

### Factors associated with change in eating ability

Changes from independent to dependent and from dependent to independent eating status are presented in Table 5-3. Diagnosis of stroke/plegia, clinically complex RUG-II category, diabetes and age were each tested for significant associations. The only significant association found was with becoming dependent in eating and age; older residents were significantly more



likely to become dependent in eating than younger residents.

### Ability to transfer

New York defines transfer as the "process of moving between positions, to/from bed, chair, standing (exclude transfers to/from bath and toilet)." The PRI lists five options for the assessment of transfer ability which we have abbreviated to 1) Req. no help; 2) Req. some help; 3) Req. 1 person; 4) Req. 2 people; and 5) Bedfast. Assessments are coded as how the task was completed 60 percent of the time during the previous four weeks or since admission, whichever is shorter.

The first category refers to residents who require no supervision or physical assistance to complete necessary transfers, although this may include the use of equipment, such as railings or a trapeze. What we have abbreviated to "some help" includes residents who require "intermittent supervision (that is, verbal cueing, guidance) and/or physical assistance for difficult maneuvers only." We considered residents in these two groups to be independent in transfer.

The third category is reserved for residents who require "one person to provide constant guidance, steadiness and/or physical assistance," although the resident may participate in transferring. The fourth group includes residents who require two people to provide constant supervision and/or to be physically lifted, including those who may require lifting equipment. As elaborated in the coding manual, this "may be required for reasons such as: the patient is obese, has contractures, has fractures (or stress fracture potential), has attached equipment that makes transfer difficult (for example, tubes). There must be a logical medical reason why the patient needs the help of two people to transfer." The final category, bedfast, is reserved for those residents who cannot and are not gotten out of bed. This may refer to a patient with acute dehydration, a severe decubitus ulcer, or terminal illness. Residents in any of these three categories were considered dependent in transfer.

### Initial distribution

Just over ten percent of the residents could transfer without any assistance at the time of the first assessment (See Table 5-1). Two percent were bedfast. The remaining 37.4 percent required some form of staff supervision or assistance in transferring. Ten percent of the residents needed only minimal ("some") help, 39.5 percent required constant assistance from one person, and the remaining 37.6 percent needed constant help from two people.

### Discharges

Although nearly 20 percent of the residents were no longer in the facility six months after their initial assessment, the discharge rate did vary by ability to transfer (See Table 5-4). The discharge rate (which includes deaths in the facility) was highest at 37.2 percent among those who were bedfast. Of those who required no help, only 16.1 percent were no longer in the facility six months later.

### Change in ability to transfer

Of those remaining in the facility, three quarters (76.1%) did not change





in their ability to transfer (See Table 5-3). The most stable group was individuals who required assistance from two people; of those, 87.4 percent continued to need help from two people in order to transfer. The least stable groups were those who were bedfast and the "some help" group. Of those who were bedfast, 41.5 percent who were still in the facility remained bedfast; most of those who changed later required the help of two people. Only half of those assessed as requiring some help remained in that category. From this category, individuals who changed were three times more likely to require additional assistance than they were to improve to needing no help.

Within categories, the most common pattern of movement was exhibited by the 41.5 percent of those who were bedfast who later required assistance from two people. One third of the residents who needed no help were no longer able to transfer without any assistance six months later. Conversely, only 2.4 percent of those who either needed some degree of help or were bedfast were able to transfer without any help. Nearly one third of those who initially needed "some help" later required continual help from one person. Approximately one quarter of those needing "no help" or "some help" either required the help of one person, two people, or were bedfast six months later. About 4 percent of those who required the help of one or two people, or were bedfast, needed either "no help" or "some help."

#### Factors associated with change in the ability to transfer

Changes from independent to dependent status and from dependent to independent status for transfer are presented in Table 5-5. The only significant ( $p < .001$ ) association found was that residents who were dependent in transfer were two and one-half times more likely to become independent if their primary diagnosis was congestive heart failure.

#### Bedfast

The proportion of nursing home residents who were bedfast at the first assessment was 2.0 percent (See Table 5-4). After exclusion of the 37.2 percent of those who were initially bedfast who were no longer in the facility six months later, the proportion who were bedfast at Time 2 was 2.1 percent. However 86 residents, 58.5 percent of those who were bedfast and remained in the facility, were no longer bedfast. An additional 136 (1.4%) of those who were not bedfast at Time 1 became bedfast, most of whom had previously required assistance from two people to transfer.

The same factors tested for association with change in transfer dependency status were also tested for association with improving from bedfast to not bedfast, and with becoming bedfast. None of these factors showed significance ( $p < .001$ ) association (See Table 5-6).

#### Mobility

New York defines mobility as the "how the patient moves about." The PRI lists five options for the assessment of mobility, which we have abbreviated to 1) Walks no help; 2) Some help; 3) Constant help; 4) Wheels no help; and 5) Wheeled/Bedfast. Assessments are coded as how the task was completed 60 percent of the time during the previous four weeks or since admission, whichever is shorter.





The "no help" category includes residents who walk with no supervision or human assistance, but may require a mechanical device (for example, a walker), but not a wheelchair. The "some help" group includes individuals who walk with intermittent supervision (that is, verbal cueing and observation), but may require assistance for difficult parts of walking, such as stairs or ramps. The third category, "constant help," is used for residents who walk "with constant one-to-one supervision and/or constant physical assistance." This "may be required if the patient cannot maintain balance, has a history of falls, has stress fracture potential, or is relearning to ambulate."

The fourth category, "wheels no help," refers to residents who wheel with no supervision or assistance, except for difficult maneuvers, such as elevators or ramps. Although a person in this category may actually be able to walk, he or she generally does not walk. The final category is reserved for residents who are wheeled, chairfast, or bedfast, and rely on someone else to move about if at all.

In defining our categories of independence and dependence in mobility, residents in the no help, some help (supervision), and the "wheels no help" categories were considered independent in mobility. Residents who needed constant help with walking or were wheeled, chairfast, or bedfast were considered dependent in mobility.

#### Initial distribution

Seventy percent of the nursing home population in New York were not walked (See Table 5-1). This includes 22.0 percent who were able to wheel themselves without help and 48.2 percent who either get wheeled or are bedfast. Of those who were able to walk, most require some degree of supervision or assistance. Eight percent of the population were able to walk without assistance, 8.7 percent require "some help," and 13.2 percent need constant help.

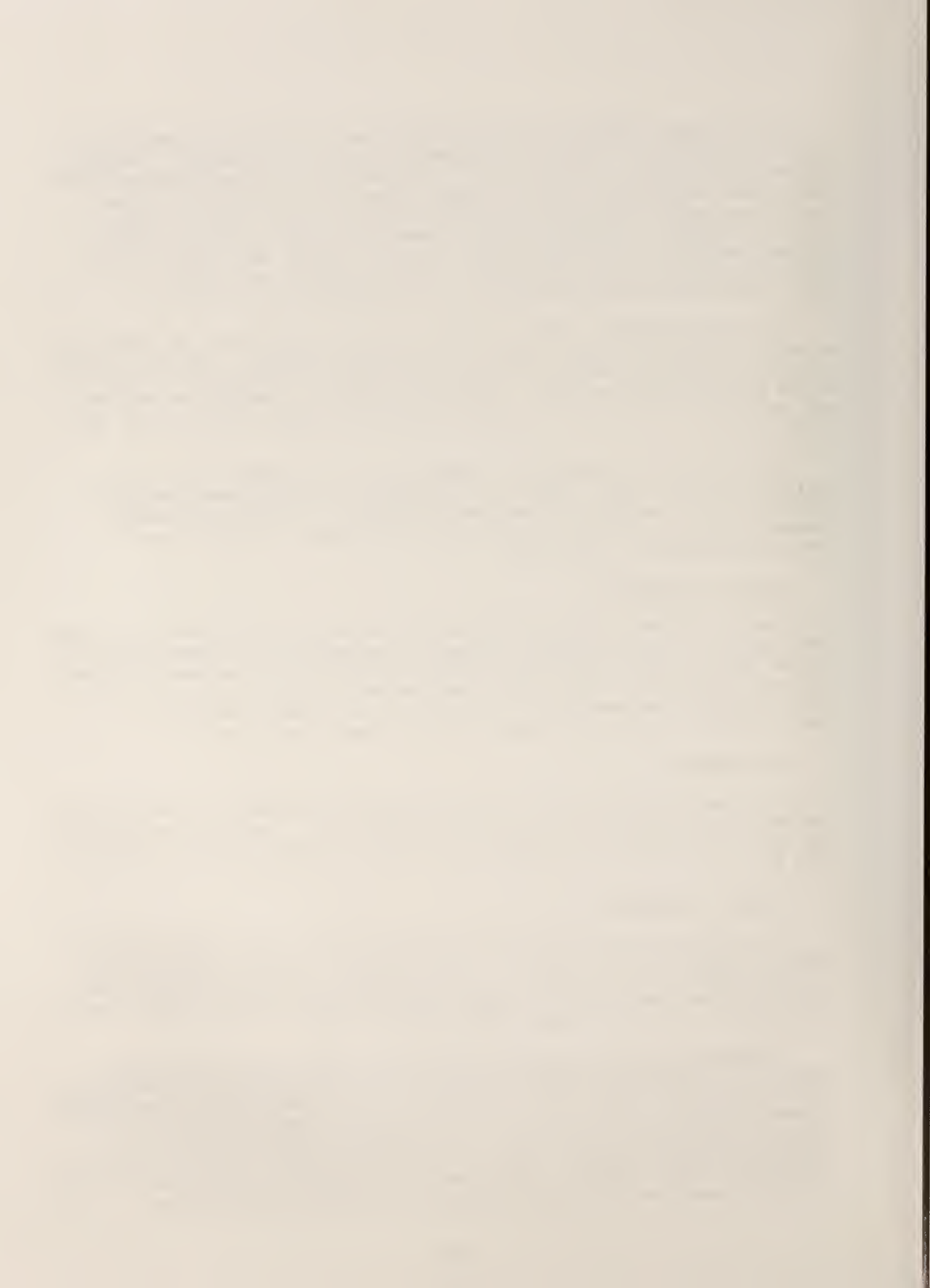
#### Discharges

The 6-month discharge rate (including discharged dead) was highest for the wheeled/bedfast group at 22.7 percent (See Table 5-7). The discharge rates for the rest of the mobility categories were about the same, ranging from 16.0 to 17.4 percent.

#### Change in mobility

Of those remaining, about three quarters (75.4%) had not experienced any change in mobility (See Table 5-7). The group least likely to change was the wheeled/bedfast group; of those not discharged 90.9 percent remained in that category. Those most likely to change were individuals who needed some form of help, whether it be only "some" help or constant help.

Highlighting the most common categories, of those in the "some help" group, 53.4 percent stayed the same, 15.1 percent later needed constant help and 12.6 percent needed no help with mobility. The remaining 20 percent either wheeled with help, were wheeled, or were chair or bedfast. For those who required constant help with mobility, 50.8 percent remained the same, 11.3 percent were able to wheel themselves for mobility and 29.2 percent needed to be wheeled or were bedbound. Additionally, 17.7 percent of those who were able to wheel themselves were later required to be wheeled or were bedfast.



## Walking

Initially only thirty percent of the nursing home residents walked or were walked. Of those who were not walking, only four percent were walking (with or without help) six months later. Yet an additional 26.4 percent of the residents who were walking (with or without help) at the time of their first assessment were no longer walking or walked six months later. For those who were able to walk without assistance initially, 292 (37.9%) of those remaining in the facility needed some form of help or were in a wheelchair, while 145 of those remaining in the facility improved to the point of not needing any assistance.

## Factors associated with change in mobility

Changes from independence to dependence and from dependence to independence in mobility are shown in Table 5-8. Significant associations were found for stroke/plegia and clinically complex for the transition to dependency. Both residents with stroke/plegia and clinically complex conditions were less likely to become dependent with respect to mobility. Although older residents were also more likely to become dependent, with those 90 years of age or over almost twice as likely to become dependent in mobility as those under 65 years of age, the association was not significant at  $p < .001$ . None of the factors tested were associated with the transition from dependence to independence in mobility,

## Toileting

New York defines toileting as "the process of getting to and from a toilet (or use of other toileting equipment, such as bedpan), transferring on and off toilet, cleansing self after elimination and adjusting clothes." The PRI lists five options for the assessment of toileting ability which we have abbreviated in the tables to 1) Req. no help; 2) Req. some help; 3) Continent with help; 4) Incont, no BR; and 5) Incont, taken BR.

In addition, we have combined the PRI "catheter" item to make a sixth category, catheterized. Toileting assessments are coded as how the task was completed 60 percent of the time during the previous four weeks or since admission, whichever is shorter. Catheter use refers to use during the past 12 weeks. The catheter variable was added to a version of the data collection form which was first used in March, 1986. We have excluded residents who were first assessed in January and February 1986 from the toileting analyses.

The "no help" category, includes residents who require no supervision or physical assistance, although special equipment, such as a raised toilet or grab bars, may be used. The "some help" category refers to individuals who require intermittent supervision for safety or encouragement, or minor physical assistance (for example, clothes adjustment or washing hands). The "continent with help" category includes individuals who are continent of bowel and bladder, but require constant supervision and/or physical assistance with major/all parts of tasks, including appliances (i.e., colostomy, ileostomy). This includes the patient "who may not be able to balance him/herself and transfer, has contractures, has a fracture, is confused or is on a rehabilitation program."

Individuals who are incontinent are classified into one of two groups.







The first, "Incont, no BR," refers to residents who are incontinent of bowel and/or bladder and are not taken to a bathroom. This includes "the patient who does not go to a toilet room, but instead may use a bedpan or continence pads. This patient may be bedbound or mentally confused to the extent that a scheduled toileting program is not beneficial."

The "Incont, taken BR" group refers to those who are incontinent of bowel and/or bladder, but are taken to a bathroom every two to four hours during the day and as needed at night. This includes the "patient who is on a formal toileting schedule, as documented in the medical record. This patient may be on a formal bowel and bladder rehabilitation program to regain or maintain control, or the toileting pattern is known and it is better psychologically and physically for the patient to be taken to the toilet (for example, to prevent decubiti)."

The sixth toileting category, which we created, includes all residents coded as having had a urinary catheter at some point in the past 12 weeks, regardless of their ability to care for the catheter or their bowel continence. Catheterized includes residents for whom, during the past twelve weeks, an indwelling or external catheter has been needed. Indwelling catheters have to have been used for any duration during the past twelve weeks, and external catheters used on a continuous basis (with proper removal and replacement during this period) for one or more days during the past twelve weeks. A physician order is required for an indwelling catheter, but not for an external catheter. This excludes catheters used to empty the bladder once, secure a specimen, or instill medication.

#### Initial distribution

Nearly ten percent of residents were able to toilet themselves without assistance at the time of the first assessment (See Table 5-1). Just over half were incontinent of bowel and/or bladder and 10.9 percent had a urinary catheter. The remaining 26.6 percent required some form of staff supervision or assistance with toileting.

#### Discharges

The proportion of discharges varied according to Time 1 toileting ability (See Table 5-9). Although the discharge rate was 19.8 percent overall, 29.3 percent of those who were catheterized were no longer in the facility six months later. Those who required no help in toileting were discharged at the lowest rate, 16.7 percent.

#### Change in toileting ability

Of those remaining in the facility, 69.3 percent had no change in their toileting ability (See Table 5-9). The least change occurred for those who were incontinent and not taken to the bathroom, 87.2 percent of whom remained in that category. The most change occurred among those who needed "some help"; although half remained in that group, 21.7 percent declined to the "help" category, and 11.8 percent to the incontinent but taken to the bathroom group. An additional 10.6 percent of those who were in the "some help" group improved to need no help.

Other common patterns of change were for those considered continent with



"help"; 17.3 percent were later incontinent but toileted regularly. For those needing no help toileting, 21.1 later needed "some" help. Of those who were incontinent (either "incont. no BR" or "incont. BR") and remained in the facility, 4.7 percent were continent ("req. no help", "req. some help" or "cont./help") six months later. Of those who were continent ( "req. no help", "req. some help", or "cont./help") and remained in the facility, 17.7 percent were incontinent ("incont. no BR" or "incont. BR") six months later.

For the purposes of this discussion, the first two groups, requires "no help" and requires "some help" can be considered to contain those residents able to toilet, and the remaining groups, "continent with help", "incontinent, not taken to bathroom", "incontinent, taken to bathroom", and "catheterized" considered to contain those unable to toilet. Using this distinction, 27.5 percent of those residents who were able to toilet at Time 1 were not able at Time 2; 3.3 percent of those who could not toilet at Time 1 could at Time 2.

### Catheterization

The prevalence of urinary catheterization for this population was 10.9 percent. Of those catheterized, 26.4 percent were no longer catheterized six months later. Of the 154 residents whose catheters were removed, most were considered incontinent and not toileted regularly at the six month assessment. The incidence of catheterization was 2.9 percent over six months, representing 161 residents newly catheterized. The majority of those newly catheterized were previously incontinent of bowel and/or bladder and, in general, were not toileted regularly.

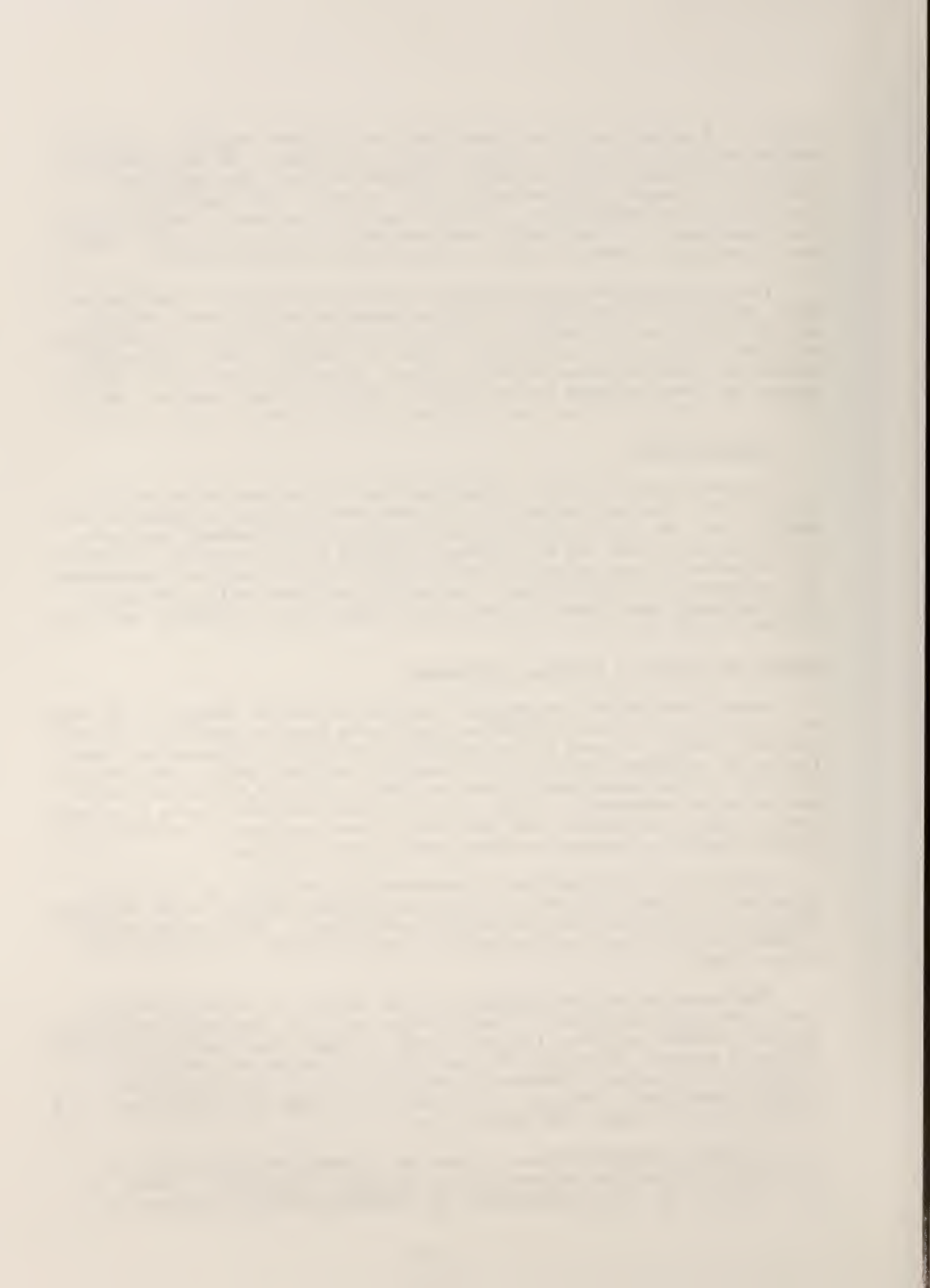
### Summary of changes in physical functioning

Several conclusions are possible from the analyses of changes in the level of function at a six-month follow-up, for nursing home residents still in the facility. First, for each of the functional activities, approximately three fourths of residents remained at the same level of functioning. When changes did occur, it was approximately twice as likely that this change would be a decline as an improvement. Changes that did occur were most likely to be one-level changes. In general, the "some help" (usually defined as supervision or minimal physical assistance) category was the most unstable.

According to the comparison of assessments of mobility, of those who walked with no help, some help, or constant help and remained in the facility, 26 percent were walking with no help six months later. Of those not walking ("wheels, no help" and "wheeled/bedfast"), only 4 percent were walking six months later.

The comparison of the assessments of the ability to transfer indicates that, with those classified as "req. no help" and "req. some help" considered able to transfer, and "req. 1 person", "req. 2 people" and "bedfast" considered unable to transfer, 25 percent of those able to transfer were not able to transfer in six months. Conversely, about 4 percent of those unable to transfer were able to transfer in six months. Of those who were bedfast, 58.5 percent were not bedfast six months later.

If those residents assessed as needing "no help" and "some help" in toileting are considered able to toilet, and those "cont/help", "incont. no BR", "incont. BR" and "catheterized" are considered unable to toilet, 27





percent of those able to toilet who remained in the facility were unable to toilet in six months. Of those unable to toilet, three percent were able to toilet in six months. Of the 53 percent who were incontinent and remained in the facility, less than five percent were continent in six months. Approximately 18 percent of those who had been continent were incontinent in six months. Finally, of the approximately 10 percent who were catheterized and remained in the facility, about 26 percent were no longer catheterized six months later.

### Clinical Conditions and Service-Related Outcomes

#### Contractures

The New York PRI uses a specific variable to record the presence or absence of contractures. The PRI documentation defines contractures as the shortening and tightening of ligaments and muscles resulting in loss of joint movement, whether or not there is an active treatment plan, and specifically excludes range of motion loss only due to spasticity or paralysis.

#### Prevalence of contractures

The overall prevalence of contractures in this sample was 30.9 percent (See Table 5-10). Prevalence of contractures was associated with seven of the eight covariates tested. Comatose residents, those with primary diagnosis of stroke, ADL dependency (in both feeding and transfer), age under 65 years, and a clinically complex profile all had significantly higher rates of contractures. Residents who were ADL independent (in both feeding and transfer), had a primary diagnosis of congestive heart failure or hip fracture were significantly less likely to exhibit contractures. Diabetes was not associated with the prevalence of contractures.

#### Recovery from contractures

Of the residents with contractures at Time 1, 18.3 percent were discharged during the study period, compared with a discharge rate of 20.4 for residents without contractures. Over the six month period, 12.2 percent of the residents with contractures who remained in the facility, no longer had contractures at the time of their second assessment. The remaining 87.8 percent of those with contractures who remained, still had contractures six months later.

ADL was the only factor tested which was significantly related to the recovery from contractures. Residents who were independent in both feeding and transfer were most likely to recover (almost 31% recovered), while greater dysfunction was associated with less likelihood of recovery. Less than 9 percent of residents dependent in both transfer and eating with contractures recovered.

#### Incidence of contractures

The overall incidence of contractures for those remaining in the nursing home was 15.0 percent for the six month period. Factors significantly related to developing contractures were ADL and primary diagnosis of stroke/plegia. Residents with stroke or plegia were more likely to develop contractures. Increased dependency, as measured by the 3-level ADL, was associated with nearly a 4-fold increase in the incidence of contractures.



The first part of the report deals with the general situation of the country and the progress of the work during the year. It is followed by a detailed account of the various projects and the results achieved. The report concludes with a summary of the work done and a list of the names of the persons who have contributed to it.

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### Summary: Contractures

Factors that had the greatest impact on prevalence, recovery, and incidence of contractures were as follows. Having a stroke or plegia, being classified clinically complex, and being 65 years of age or under were factors associated with the highest prevalence. Residents who were independent in both feeding and transfer were most likely to recover. Individuals with stroke/plegia had the highest likelihood of acquiring contractures, while those independent in transfer and feeding (ADL independent) were least likely to develop contractures.

### Decubitus ulcers

The New York Patient Review Instrument records the stage characterizing the level of skin breakdown of the worst decubitus ulcer. Residents with no sores are coded as zero, indicating no reddened skin or breakdown. Level 1 sores are characterized by reddened skin, with potential breakdown. Level 2 sores are characterized by blushed skin with a dusty colored, superficial layer of broken or blistered skin. Sores for which the subcutaneous skin is broken down are scored as Level 3.

For a patient to be cited as a Level 4, the following criteria must be met. A Level 4 sore exhibits necrotic breakdown of skin and subcutaneous tissue which may involve muscle, fascia and bone. In addition, there must be documentation by a licensed clinician which describes the following three components: a description of the patient's decubitus, circumstances or medical condition which led to the decubitus, and an active treatment plan. If the patient is at Level 4, but the documentation qualifier has not been met, the sore is scored as a Level 5.

### Prevalence of decubitus ulcers

The prevalence of decubitus ulcers in the sample was 15.4 percent (See Table 5-1). Stages of sores ranged from Level 1 to Level 4 and included some residents with the Level 5 code, indicating that there was a Level 4 sore present, but the documentation of that sore was incomplete. Residents with sores were most likely to have their worst sore be at Level 1 or 2 (See Table 5-12). Of those with sores, 31.0 percent were Level 1, 35.7 percent were Level 2, 19.2 percent were Level 3, and 13.2 percent were Level 4. Less than one percent of residents with sores had Level 5 as their worst sore, indicating that only a small proportion of the Stage 4 sores were inadequately documented.

Comatose and clinically complex residents were found to have higher prevalence of decubitus ulcers (See Table 5-11). Also significant was the trend with the 3-level ADL; with increasing dependency, the prevalence of pressure sores also increased.

### Recovery from decubitus ulcers

Recovery from decubitus ulcers was examined in two ways. We first examined residents who had pressure sores initially and looked to see who no longer had any sores six months later. For this dichotomy of having versus not having any sores, we explored the relationship between the same set of covariates and recovery from or maintenance of the sore(s). In addition, Table



5-12 shows the patterns of change based on the severity of the resident's worst decubitus ulcer over the six month study period.

Just over half the residents with a pressure sore no longer had a sore at the time of the second assessment. There was a significant trend found in the association between ADL and recovery of sores. Independent residents were most likely to recover. As functional ability decreased, residents were more likely to maintain sores.

In looking at the patterns of change in level of worst sore, of those with sores initially, even residents who did not improve to "no sore" status were still more likely to have the level of their sore be less severe than more severe (See Table 5-12). However, almost half the residents who had a Level 4 sore at Time 1 who remained in the facility still had at least one Level 4 sore six months later.

#### Incidence of decubitus ulcers

The proportion of residents who had no sores initially but who developed at least one sore during the six month study period was 9.6 percent (See Table 5-11). A significantly higher incidence rate was found for residents who were dependent in ADL, 13.5 percent of whom newly developed sores. By contrast, only 3.7 percent of the ADL independent residents developed sores. Looking at the residents newly reported to have sores, most new sores were at the Level 1 (34.3%) or Level 2 (43.0%) stage, however, 14.5 percent were Level 3 and 8.2 percent were Level 4 or 5 (See Table 5-12).

#### Summary: Decubitus ulcers

The more dependent residents were, the more likely they were to have, keep and develop sores. The only other factors significantly associated with pressure sores were associated with the cross-sectional prevalence of sores. Both comatose and clinically complex residents were more likely to have decubitus ulcers at Time 1.

#### Urinary tract infections

The PRI includes a specific item to indicate whether the resident has a urinary tract infection. The coding manual says to code the presence of a urinary tract infection (UTI) if, during the past twelve weeks, symptoms of a UTI have been exhibited or it has been diagnosed by lab tests. Symptoms may include frequent voiding, foul smelling urine, voiding small amounts, cloudy urine, sediment and an elevated temperature. A UTI that has not been confirmed yet by lab tests, but is symptomatic, is included. Patients who appear asymptomatic, but whose lab values are positive (e.g., mentally confused or incontinent patients), are included. Those with symptoms, but with negative lab values, are excluded.

#### Prevalence of urinary tract infections

The prevalence of urinary tract infections in this population of nursing home residents from New York was 13.0 percent (See Table 5-13). The rate was more than three times higher for catheterized residents at 41.6 percent. Significantly higher prevalence rates were also found for individuals with diabetes and those who were dependent in ADL. A significantly lower UTI rate







was found for nursing home residents who were independent in ADL.

#### Recovery from urinary tract infections

Seventy percent of the residents with urinary tract infections present at the time of the first assessment did not have a UTI six months later. Thirty percent of those with UTI initially still had a UTI six months later. Individuals with catheters were the only group significantly more likely to still have urinary tract infections.

#### Incidence of urinary tract infections

The overall incidence rate for new urinary tract infections was 8.6 percent. Catheterized residents were more than two and one half times more likely to develop urinary tract infections than the overall population. In addition, the greater the dependency in ADL, the greater the incidence in UTI.

#### Summary: Urinary tract infections

The presence of a urinary catheter was the factor most consistently related to urinary tract infections, associated with significantly higher prevalence, maintenance and incidence of the infection. Dependency in ADL was related to higher prevalence and incidence, but had no association with recovery. Diabetics also had significantly higher prevalence of UTI.

#### Bowel and/or bladder training

As described in the coding manual for New York's PRI, "the goal of this treatment is to gain or regain optimal bowel and/or bladder function and to re-establish a pattern. It is much more than a toileting schedule or a maintenance/conditioning program. Rather it is as intense treatment which is very specific and unique for each patient and is of short term duration (i.e., usually not longer than six weeks)." Specific criteria follow, quoted from the coding manual and exclude a maintenance toileting schedule and a restorative toileting program that does not meet the treatment requirements specified in the definitions.

"Bladder rehabilitation: Will generally include these step-by-step procedures which are closely monitored, evaluated and documented: (1) mental and physical assessment of the patient to determine training capacity; (2) a 24 hour flow sheet or chart documenting voiding progress; (3) possibly increased fluid intake during the daytime; (4) careful attention to skin care; (5) prevention of constipation; (6) in the beginning may be toileted 8 to 12 times per day with decreased frequency with progress.

"Bowel rehabilitation: A program to prevent chronic constipation/impaction. The plan will generally include: (1) assessment of past bowel movements, relevant medical problems, medication use; (2) a dietary regimen of increased fluids and bulks (e.g., bran, fruits); (3) regular toileting for purposes of bowel evacuation; (4) use of glycerin suppositories or laxatives; (5) documentation on a worksheet or Kardex."

#### Analysis of bowel and/or bladder training

A bowel and/or bladder training program was used for 1.6 percent of the

ORIGINAL ARTICLES

1. The Effect of the Diet on the Course of the Disease in the Case of the Patient with Diabetes Mellitus. (Continued from page 1000.)  
2. The Effect of the Diet on the Course of the Disease in the Case of the Patient with Diabetes Mellitus. (Continued from page 1000.)

ORIGINAL ARTICLES

3. The Effect of the Diet on the Course of the Disease in the Case of the Patient with Diabetes Mellitus. (Continued from page 1000.)  
4. The Effect of the Diet on the Course of the Disease in the Case of the Patient with Diabetes Mellitus. (Continued from page 1000.)

ORIGINAL ARTICLES

5. The Effect of the Diet on the Course of the Disease in the Case of the Patient with Diabetes Mellitus. (Continued from page 1000.)  
6. The Effect of the Diet on the Course of the Disease in the Case of the Patient with Diabetes Mellitus. (Continued from page 1000.)

ORIGINAL ARTICLES

7. The Effect of the Diet on the Course of the Disease in the Case of the Patient with Diabetes Mellitus. (Continued from page 1000.)  
8. The Effect of the Diet on the Course of the Disease in the Case of the Patient with Diabetes Mellitus. (Continued from page 1000.)

ORIGINAL ARTICLES

9. The Effect of the Diet on the Course of the Disease in the Case of the Patient with Diabetes Mellitus. (Continued from page 1000.)  
10. The Effect of the Diet on the Course of the Disease in the Case of the Patient with Diabetes Mellitus. (Continued from page 1000.)

ORIGINAL ARTICLES

11. The Effect of the Diet on the Course of the Disease in the Case of the Patient with Diabetes Mellitus. (Continued from page 1000.)  
12. The Effect of the Diet on the Course of the Disease in the Case of the Patient with Diabetes Mellitus. (Continued from page 1000.)

ORIGINAL ARTICLES

13. The Effect of the Diet on the Course of the Disease in the Case of the Patient with Diabetes Mellitus. (Continued from page 1000.)  
14. The Effect of the Diet on the Course of the Disease in the Case of the Patient with Diabetes Mellitus. (Continued from page 1000.)

population (See Table 5-14). Only one of the 98 residents (1.0%) who remained in the facility was still on the bowel/bladder training program six months later. Fourteen of the residents who remained in the nursing home began bowel and/or bladder training, for a six month incidence rate of 0.2 percent. None of the associations tested with these measures were significant.

#### Summary: Bowel and/or bladder training

Bowel and/or bladder training programs, as defined above, were not used very often in this population. This is not surprising, given that this is a cross-sectional sample, so most residents have been in the facility for many months, if not years, by the time of the first assessment used in these analyses. When bowel/bladder training programs were used, they were generally no longer in place after six months, and were rarely instituted among residents who remained in the facility at the end of the study period.

#### Physical restraints

The New York PRI form uses a specific variable to record the presence or absence of restraints. The PRI documentation defines use of restraints as "A device was used during the daytime during the past four weeks to limit, restrict or keep patient movement under control. To qualify as a "Yes" on the PRI, (1) the restraints must have been given for at least 2 weeks (14 days) during the past four weeks and been applied for at least two continuous hours per day; (2) a physician's order must exist requiring the restraints and the care plan must address this need (physician order may specify PRN basis or a frequency); and (3) restraints must have been provided during the daytime as defined below. Daytime includes all the time from when the patient wakes up in the morning to when the patient goes to sleep at night. Include belts, cuffs, mitts, geriatric chairs, harnesses, locked doors/gates, nets, full length side rails and domes as restraints. (Include patients who are on bedrest are bedbound or take daytime naps and require side rails.)"

All of the following are specifically mentioned as not applicable for this item: chemical restraints, application only at night, application for less than two continuous hours per day for 14 days, use only for transportation, and devices which the patient can manipulate and loosen/remove, such as velcro seat belts.

#### Prevalence of use of physical restraints

The overall prevalence of the use of physical restraints in this sample was 56.9 percent (See Table 5-15). Prevalence of restraints was associated with ADL and age. Older residents were most likely to be restrained. There was a dramatic trend in use by ADL category; dependent residents had eleven times greater use than independent residents (78.8% versus 7.4%).

#### Discontinuation of use of physical restraints

Of the residents with restraints at Time 1, 20.8 percent were discharged (including discharged dead) during the study period, compared with a discharge rate of 18.4 percent for residents without restraints. Over the six month period, 7.1 percent of the residents with restraints who remained in the facility, no longer had restraints at the time of their second assessment. The remaining 92.9 percent of those with restraints who remained, still had





restraints six months later. Again, the change in use was associated with ADL. Greater dependency was related to the increased tendency to maintain the use of restraints.

#### Incidence of use of physical restraints

The overall incidence of use of physical restraints for those remaining in the nursing home was 22.6 percent for the six month period. New use of restraints was also associated with ADL. Incidence of restraint use increased progressively with increasing ADL dysfunction.

#### Summary: Physical restraints

ADL was the only factor consistently associated with restraint use. The significant trends showed that greater dependence in ADL was associated with increased use, increased likelihood of retaining their use, and increased likelihood of their becoming used. The only other significant association was age with prevalence.

#### Summary of clinical conditions and service related outcomes

Rates of prevalence, maintenance and recovery or discontinuation, and incidence of clinical conditions and service-related outcomes were computed for nursing home residents of facilities in New York State. Residents with good physical functioning consistently had better outcomes, regardless of the outcome measured. The poorer a resident's physical functioning, the more likely the resident was to have a worse outcome. Although other characteristics were found to be related to specific measures, no other potential case-mix adjuster was consistently associated with the clinical conditions and service-related outcomes tested in these analyses.



THE UNIVERSITY OF CHICAGO

PHILOSOPHY DEPARTMENT

PHILOSOPHY 101

PHILOSOPHY 102

PHILOSOPHY 103

Table 5-1

Distribution of Time 1 characteristics, New York State nursing homes, 1986

DEMOGRAPHIC CHARACTERISTICS			FUNCTIONAL ASSESSMENT (cont'd)		
	n	%		n	%
Age			3-Level ADL (based on feeding and transfer)		
<65	601	5.1	Most Independent	2269	19.2
65-89	8157	69.2	Intermediate	4560	38.7
90+	3028	25.7	Most Dependent	4966	42.1
Sex			Toileting/Continence		
Male	2601	22.1	Req no help	717	9.5
Female	9191	77.9	Req some help	888	11.8
Primary payment source			Cont w/help	1117	14.8
Medicaid	9342	79.2	Incont, not taken		
Medicare	274	2.3	to bathroom	2227	29.5
Other	2179	18.5	Incont, taken to		
			bathroom	1773	23.5
			Catheterized	826	10.9
Length of stay at Time 1			CLINICAL CONDITIONS		
<= 30 days	248	2.1	Comatose		
31-60 days	352	3.0	Yes	38	0.3
61-90 days	363	3.1	No	11743	99.6
91-180 days	837	7.1			
180 days-1 year	1410	12.0	Most Severe Decubitus Level		
1-2 years	2381	20.2	None	9977	84.6
2-3 years	1598	13.5	1	563	4.8
3-10 years	4042	34.3	2	649	5.5
10 + years	556	4.7	3	349	3.0
			4	240	2.0
FUNCTIONAL ASSESSMENT			5	17	0.1
Feeding			Contractures		
Feeds self	1192	10.1	Yes	2329	30.9
Needs some help	5637	47.8	No	5216	69.1
Needs contin help	1871	15.9			
Totally hand fed	2580	21.9	Diabetes		
Tube fed	515	4.4	Yes	1336	17.7
Transfer			No	6211	82.3
Req no help	1250	10.6	Urinary Tract Infection		
Intermittent help	1215	10.3	Yes	982	13.0
Req 1 person	4661	39.5	No	6561	86.9
Req 2 people	4434	37.6			
Bedfast	234	2.0	Hip Fracture		
Mobility			Yes	214	1.8
Walks no help	934	7.9	No	11581	98.2
Walks some help	1027	8.7			
Walks contin help	1557	13.2			
Wheels no help	2593	22.0			
Wheeled/Bedfast	5683	48.2			

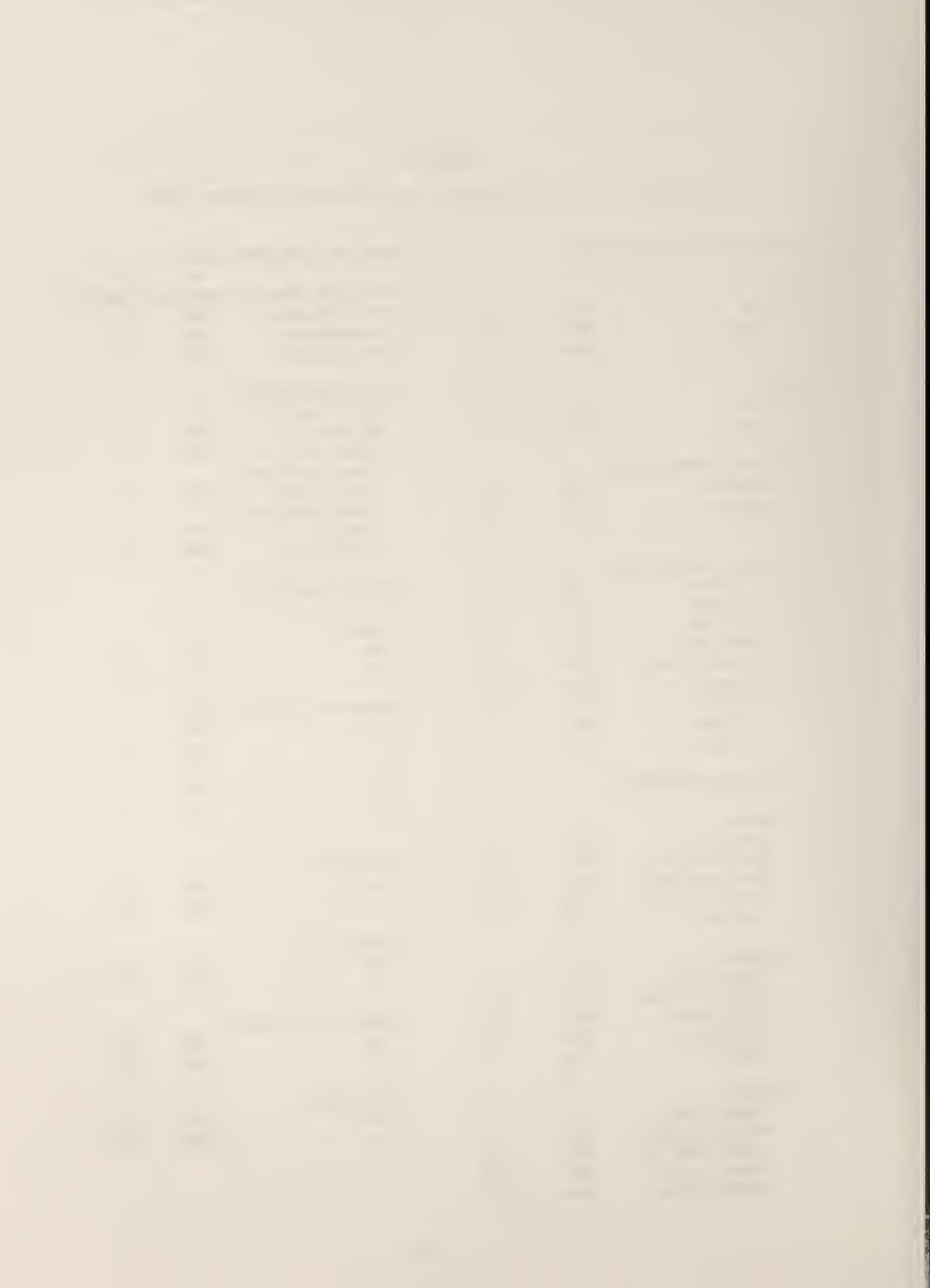


Table 5-1 (cont'd)

Distribution of time 1 characteristics, New York State nursing homes, 1986

CLINICAL CONDITIONS (cont'd)

	n	%
Stroke/Plegia		
Yes	1212	10.3
No	10583	89.7
Congestive Heart Disease		
Yes	182	1.5
No	11613	98.5

SERVICE-RELATED ITEMS

Bowel and Bladder Training		
Yes	121	1.6
No	7425	98.4
Restraints		
Yes	4295	56.9
No	3252	43.1

RUG-II CLASSIFICATION

Resource Utilization Group (RUG-II)

Special Care A	175	1.5
Special Care B	524	4.4
Heavy Rehab A	91	0.8
Heavy Rehab B	382	3.2
Clinical Complex A	170	1.4
Clinical Complex B	804	6.9
Clinical Complex C	571	4.9
Clinical Complex C	100	0.8
Severe Behavior A	156	1.3
Severe Behavior B	586	5.0
Severe Behavior C	156	1.3
Reduced Phys. A	1402	11.9
Reduced Phys. B	557	4.7
Reduced Phys. C	4200	35.6
Reduced Phys. D	1443	12.2
Reduced Phys. E	373	3.2
HRF-Reduced Phys.	105	0.9

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Table 5-2

Change in ability to feed over 6 month period for nursing home residents remaining in the facility, from a sample of nursing homes in New York State, 1986

TIME_1	TIME_2					ROW TOTAL	Died or Discharged
	Feeds self	Req some help	Continu- al help	Fed by hand	Tube fed		
Feeds self	569	367	24	13	3	976 10.3	216 (18.1)
Req some help	219	3602	594	202	32	4649 49.0	988 (17.5)
Continual help	8	343	793	352	25	1521 16.0	350 (18.7)
Fed by hand	2	54	121	1752	72	2001 21.1	579 (22.4)
Tube fed		8	6	17	308	339 3.6	176 (34.2)
COLUMN TOTAL	798 8.4	4374 46.1	1538 16.2	2336 24.6	440 4.6	9486 100.0	2309 19.6

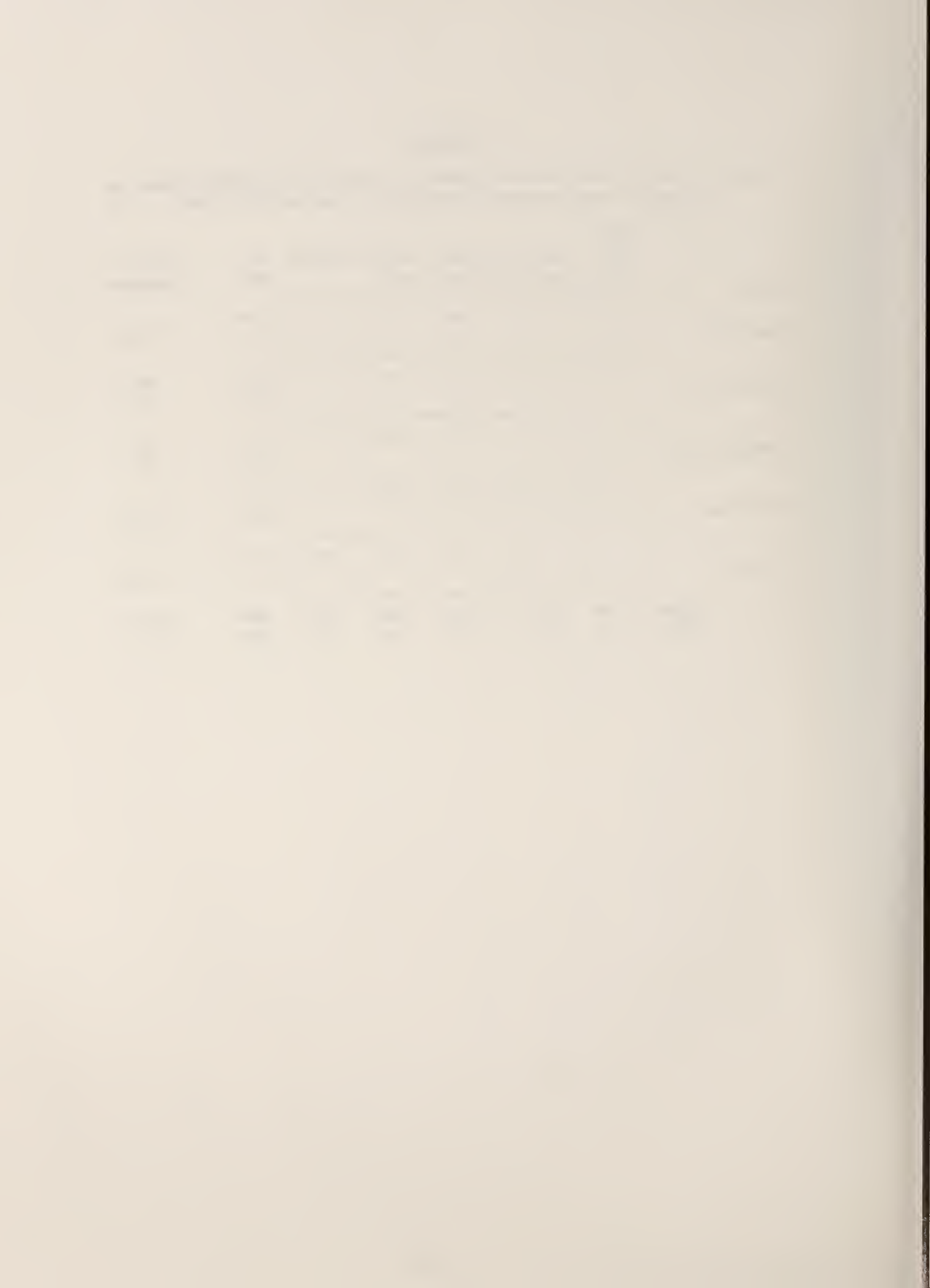


Table 5-3

Changes in eating dependency status over 6-month period for residents in  
a sample of nursing homes in New York State, 1986.

		<u>Independent to Dependent</u>			<u>Dependent to Independent</u>		
		<u>percent</u>	<u>n</u>	<u>p</u>	<u>percent</u>	<u>n</u>	<u>p</u>
Overall		15.4	(868/5625)		10.7	(415/3861)	
1							
Stroke/Plegia	Yes	11.5	(68/593)		10.2	(40/393)	
	No	15.9	(800/5032)	.01	10.8	(375/3468)	.76
2							
Clinically Complex	Yes	11.6	(93/804)		13.0	(63/485)	
	No	16.1	(775/4821)	.00	10.4	(352/3376)	.10
3							
Diabetes	Yes	12.9	(89/690)		9.3	(31/335)	
	No	15.4	(437/2845)	.12	10.8	(236/2184)	.44
Age							
	<65	4.8	(12/248)		8.2	(20/245)	
	65-89	15.0	(595/3979)		10.9	(287/2627)	
	90+	18.7	(261/1397)	.00*	10.9	(107/983)	.40

\* p < .001

1

Based on primary diagnosis.

2

RUG-II category which includes residents without severe behavioral problems who have the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.

3

Based on check list of medical conditions.

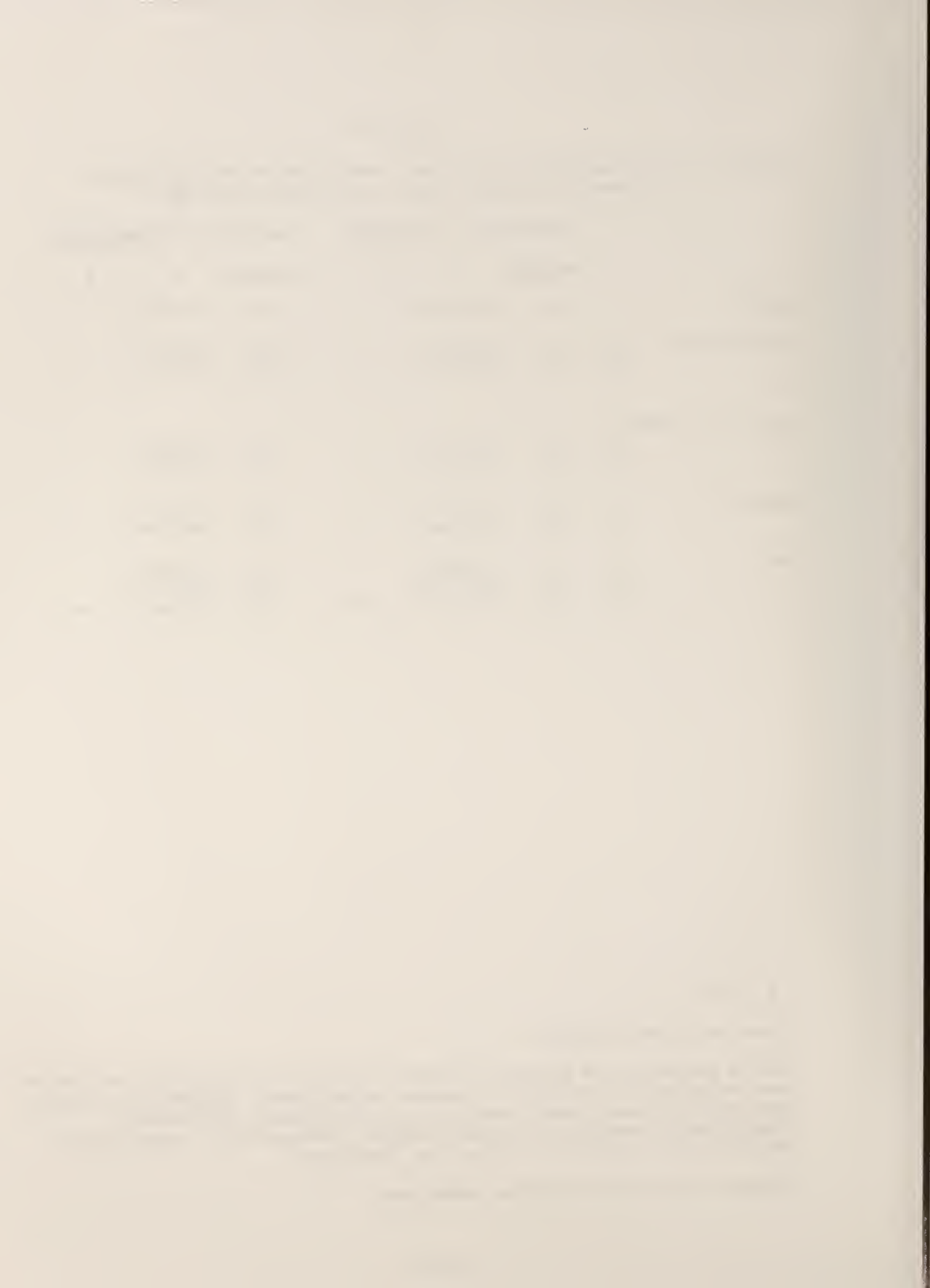


Table 5-4

Change in ability to transfer over 6 month period for nursing home residents remaining  
in the facility, from a sample of nursing homes in New York State, 1986

TIME_1	TIME_2					ROW TOTAL	Died or Discharged
	Req no help	Req some help	Req 1 person	Req 2 people	Bedfast		
Req no help	688	211	117	30	3	1049 11.0	201 (16.1)
Req some help	126	495	302	55	3	981 10.3	234 (19.2)
Req 1 person	70	179	2888	611	30	3778 39.8	883 (18.9)
Req 2 people	4	21	319	3087	100	3531 37.2	903 (20.4)
Bedfast	1	2	22	61	61	147 1.5	87 (37.2)
COLUMN TOTAL	889 9.4	908 9.6	3648 38.4	3844 40.5	197 2.1	9486 100.0	2308 (19.6)



# THE HISTORY OF THE

REIGN OF KING CHARLES THE FIRST

BY SAMUEL JOHNSON

IN TEN VOLUMES

LONDON: Printed by A. MILLAR, in Pall-mall; and by J. KNEELAND, in St. Dunstons Church-yard, 1764.

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Table 5-5

Changes in transferring dependency status over 6-month period for residents  
in a sample of nursing homes in New York State, 1986.

		<u>Independent to Dependent</u>			<u>Dependent to Independent</u>		
		<u>percent</u>	<u>n</u>	<u>p</u>	<u>percent</u>	<u>n</u>	<u>p</u>
Overall		25.1	(510/2030)		3.7	(277/7456)	
1							
Hip Fracture	Yes	32.0	(8/25)		8.7	(13/149)	
	No	24.4	(502/2005)	.57	3.6	(264/7307)	.00
1							
Stroke/Plegia	Yes	28.4	(21/74)		2.0	(18/912)	
	No	25.0	(489/1956)	.60	3.6	(259/6544)	.00
2							
Clinically Complex	Yes	26.4	(48/182)		3.1	(34/1107)	
	No	25.0	(462/1848)	.75	3.8	(243/6349)	.25
1							
Congestive Heart Failure	Yes	26.0	(13/50)		9.5	(7/74)	
	No	25.1	(497/1980)	.98	3.7	(270/7382)	.00*
1							
Age	<65	13.4	(13/97)		3.0	(12/396)	
	65-89	25.1	(376/1497)		4.0	(202/5109)	
	90+	27.8	(121/436)	.01	3.2	(63/1944)	.28

\* p < .001

1

Based on primary diagnosis.

2

RUG-II category which includes residents without severe behavioral problems who have at least one of the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.

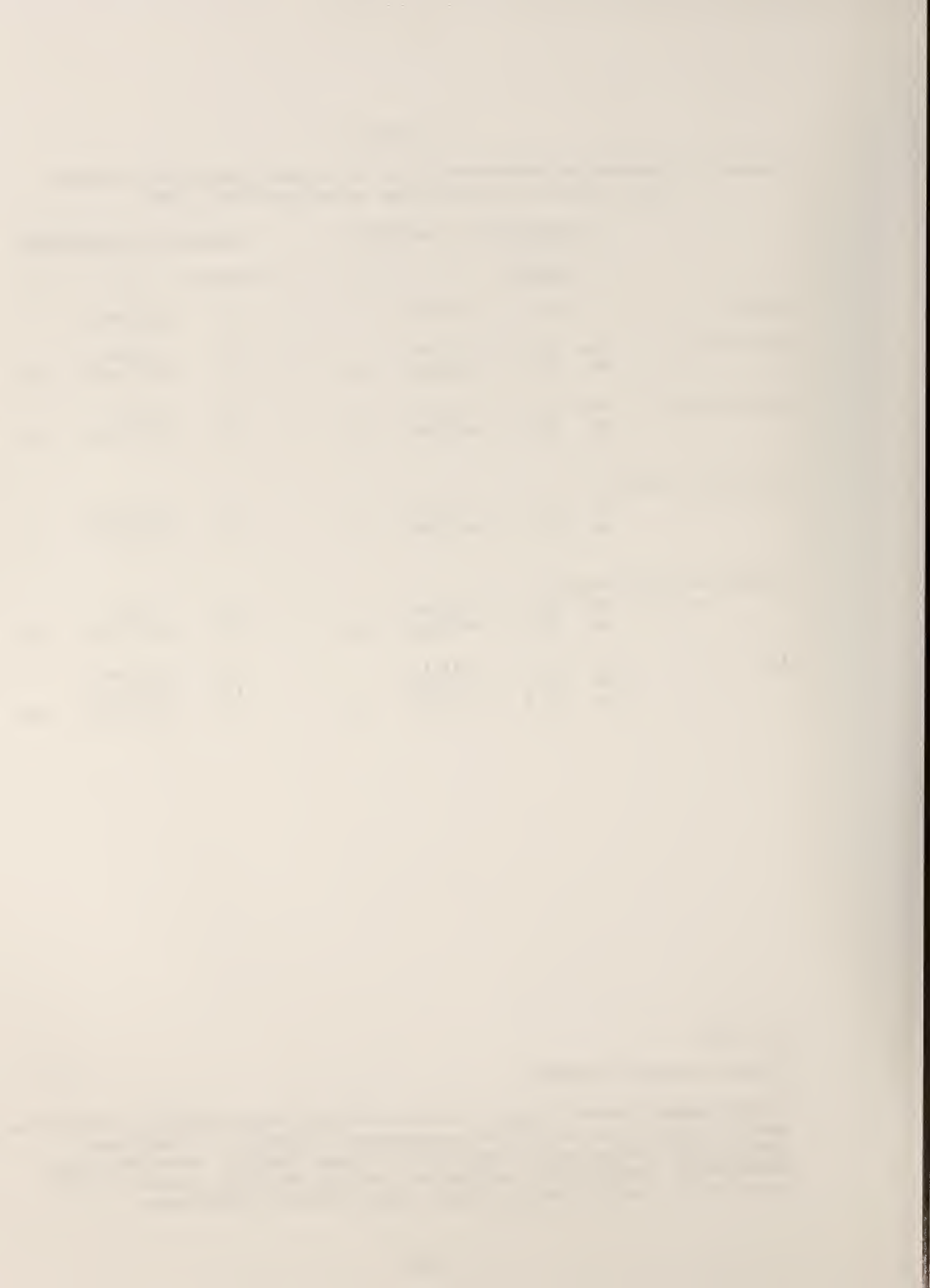


Table 5-6

Changes in bedfast status over 6-month period for residents in a sample of nursing homes in New York State, 1986.

		<u>Bedfast to Not Bedfast</u>			<u>Not Bedfast to Bedfast</u>		
		<u>percent</u>	<u>n</u>	<u>p</u>	<u>percent</u>	<u>n</u>	<u>p</u>
Overall		58.6	(86/147)		1.5	(136/9339)	
Hip Fracture <sup>1</sup>	Yes	100.0	(2/2)		1.2	(2/172)	
	No	57.9	(84/145)	.34	1.5	(134/9167)	.54
Stroke/Plegia <sup>1</sup>	Yes	64.7	(11/17)		1.5	(15/969)	
	No	57.7	(75/130)	.77	1.4	(121/8370)	.91
Clinically Complex <sup>2</sup>	Yes	75.0	(12/16)		1.9	(24/1273)	
	No	56.5	(74/131)	.25	1.4	(112/8066)	.21
Congestive Heart Failure <sup>1</sup>	Yes	0.0	(0/0)		0.0	(0/124)	
	No	58.5	(86/147)	.99	1.5	(136/9215)	.16
Age	<65	33.3	(4/12)		1.0	(5/481)	
	65-89	57.4	(58/101)		1.6	(101/6505)	
	90+	70.6	(24/34)	.07	1.3	(30/2346)	.47

1

Based on primary diagnosis.

2

RUG-II category which includes residents without severe behavioral problems who have at least one of the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.





Table 5-7

Change in mobility over 6 month period for nursing home residents remaining in the facility, from a sample of nursing homes in New York State, 1986

TIME_1	TIME_2					ROW TOTAL	Died or Discharged
	Walks no help	Some help	Constant help	Wheels no help	Wheeled/ bedfast		
Walks no help	479	174	36	41	41	771 8.1	163 (17.4)
Walks some help	107	455	129	68	93	852 9.0	175 (17.0)
W/Constant help	17	96	665	148	382	1308 13.8	249 (16.0)
Wheels no help	18	32	62	1664	383	2159 22.8	434 (16.7)
Wheeled/Bedfast	3	21	127	248	3996	4395 46.3	1288 (22.7)
COLUMN TOTAL	624 6.6	778 8.2	1019 10.7	2169 22.9	4895 51.6	9485 100.0	2309 (19.6)



Table 5-8

Changes in mobility dependency status over 6-month period for residents in  
a sample of nursing homes in New York State, 1986

		<u>Independent to Dependent</u>			<u>Dependent to Independent</u>		
		<u>percent</u>	<u>n</u>	<u>p</u>	<u>percent</u>	<u>n</u>	<u>p</u>
Overall		24.8	(728/2930)		9.0	(591/6555)	
Hip Fracture <sup>1</sup>	Yes	20.8	(15/72)		14.7	(15/102)	
	No	24.9	(713/2858)	.51	8.9	(576/6453)	.06
Stroke/Plegia <sup>1</sup>	Yes	15.0	(52/347)		8.8	(56/639)	
	No	26.2	(676/2583)	.00*	9.0	(535/5916)	.87
Clinically Complex <sup>2</sup>	Yes	17.4	(78/447)		8.7	(73/842)	
	No	26.2	(650/2483)	.00*	9.1	(518/5713)	.76
Congestive Heart Failure <sup>1</sup>	Yes	23.4	(11/47)		13.0	(10/77)	
	No	24.9	(717/2883)	.95	9.0	(581/6478)	.31
Age	<65	15.3	(30/196)		8.4	(25/297)	
	65-89	24.7	(506/2047)		9.3	(423/4558)	
	90+	28.0	(192/686)	.00	8.4	(143/1694)	.55

\* p < .001

1

Based on primary diagnosis.

2

RUG-II category which includes residents without severe behavioral problems who have the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.

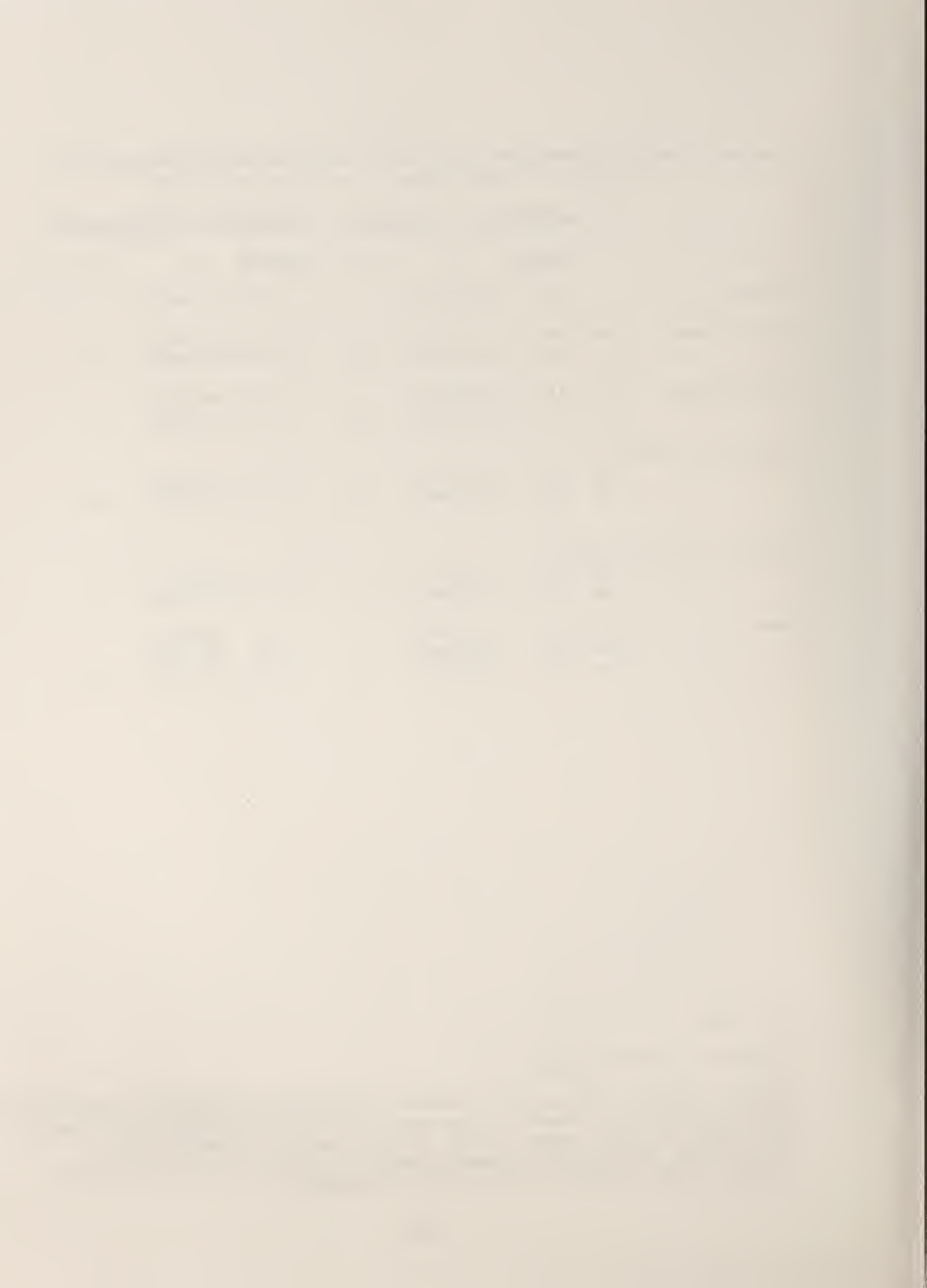


Table 5-9

Change in ability to toilet over 6 month period for nursing home residents remaining in the facility, from a sample of nursing homes in New York State, 1986

TIME_1	TIME_2						ROW TOTAL	Died or Discharged
	Req no help	Req some help	Cont/ help	Incont no BR	Incont BR	Catheter		
Req no help	393	132	27	20	18	7	597 9.8	120 (16.7)
Req some help	77	358	158	37	86	11	727 12.0	161 (18.1)
Continent w help	24	78	546	76	157	27	908 15.0	209 (18.7)
Incont, no BR	4	19	35	1471	171	78	1778 29.4	449 (20.2)
Incont, taken BR	1	19	76	326	1001	38	1461 24.1	312 (17.6)
Catheterized	7	6	14	91	36	430	584 9.69	242 (29.3)
COLUMN TOTAL	506 8.4	612 10.1	856 14.1	2021 33.4	1469 24.3	591 9.8	6055 100.0	1493 (19.8)



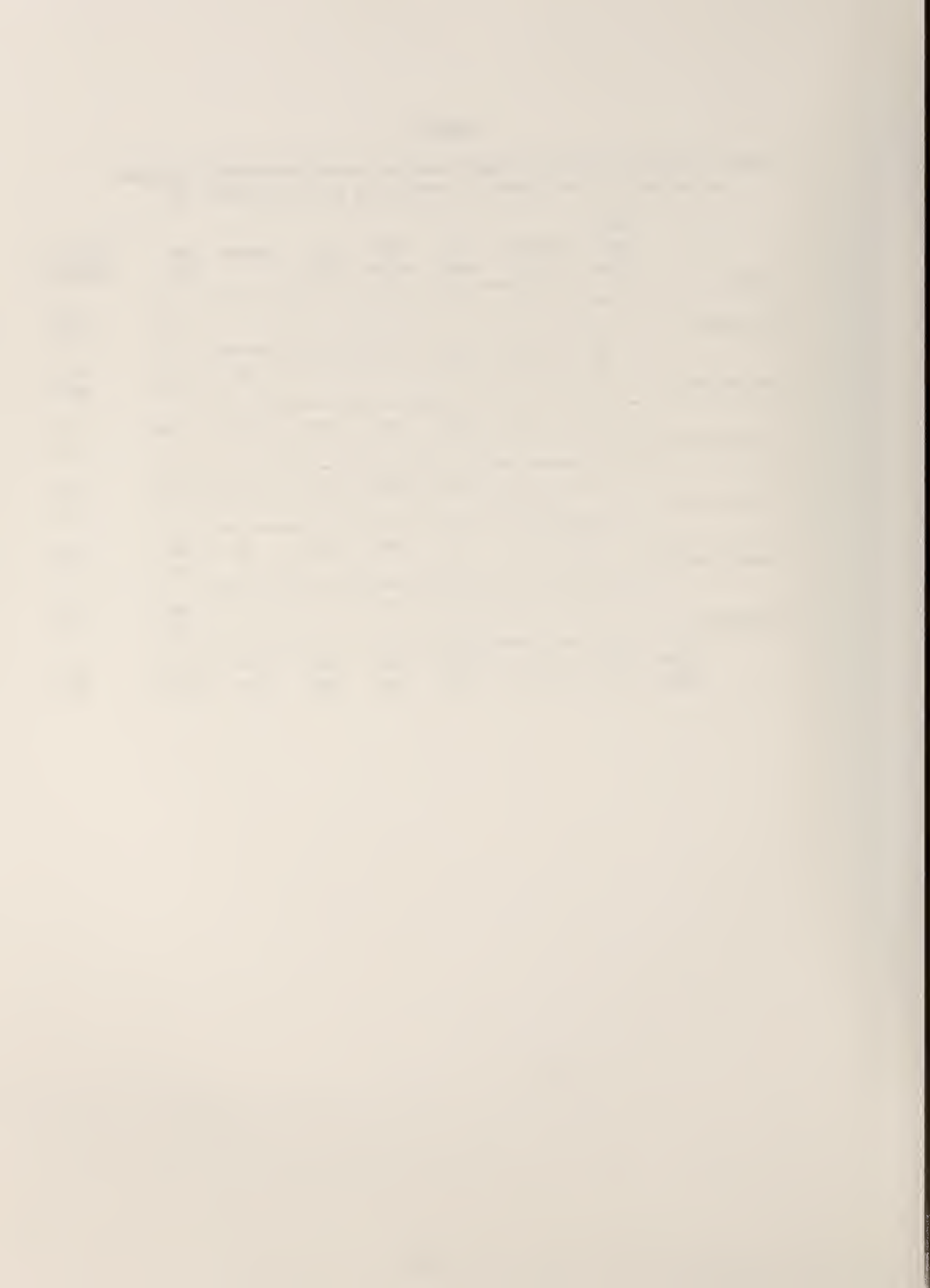


Table 5-10

Prevalence, maintenance, recovery, and incidence of contractures over 6-month period for residents in a sample of nursing homes in New York State, 1986

<u>Independent Variable</u>	<u>Prevalence</u>	<u>Maintenance</u>	<u>Recovery</u>	<u>Incidence</u>
Overall	30.9 (2329/7545)	87.8 (1670/1903)	12.2 (233/1903)	15.0 (624/4149)
1 Hip Fracture				
Yes	17.7 (23/130)*	89.5 (17/19)	10.5 (2/19)	10.0 (8/80)
No	31.1 (2306/7415)	87.7 (1653/1884)	12.3 (231/1884)	15.1 (616/4069)
1 Stroke/Plegia				
Yes	49.0 (408/833)*	86.0 (294/342)	14.0 (48/342)	27.0 (88/326)*
No	28.6 (1921/6712)	88.1 (1376/1561)	11.9 (185/1561)	14.0 (536/3823)
1 Congestive Heart Failure				
Yes	13.4 (15/112)*	70.0 (7/10)	30.0 (3/10)	12.1 (8/66)
No	31.1 (2314/7433)	87.8 (1663/1893)	12.2 (230/1893)	15.1 (616/4093)
2 Clinically Complex				
Yes	40.7 (423/1040)*	87.2 (300/344)	12.8 (44/344)	18.1 (84/465)
No	29.3 (1906/6505)	87.9 (1370/1559)	12.1 (189/1559)	14.7 (540/3684)
3 ADL (Transfer & Eating)				
Independent	6.2 (86/1393)*	69.2 (54/78)*	30.8 (24/78)*	5.7 (60/1058)*
Intermediate	26.9 (782/2909)	84.1 (575/684)	15.9 (109/684)	15.5 (266/1713)
Dependent	45.1 (1461/3243)	91.2 (1041/1141)	8.8 (100/1141)	21.6 (298/1378)
Age				
< 65	44.6 (190/426)*	90.6 (145/160)	9.4 (15/160)	15.3 (29/189)
65-89	30.4 (1578/5191)	87.3 (1140/1306)	12.7 (166/1306)	15.5 (447/2893)
90 +	29.1 (559/1923)	88.3 (385/436)	11.7 (51/436)	13.9 (148/1065)
4 Diabetes				
Yes	28.3 (377/1334)	87.0 (260/299)	13.0 (39/299)	13.8 (100/724)
No	31.4 (1952/6211)	87.9 (1410/1604)	12.1 (194/1604)	15.3 (524/3425)
4 Comatose				
Yes	77.8 (21/27)*	81.2 (13/16)	18.8 (3/16)	00.0 (2/2)
No	30.7 (2305/7511)	87.8 (1655/1884)	12.2 (229/1884)	15.0 (622/4144)

\*

p < .001

1

Based on ICD-9 code of primary diagnosis.

2

RUG-II category which includes residents without severe behavioral problems who have the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.

3

Independent is defined as independent (needs no or intermittent supervision) in transfer and eating; intermediate is defined as dependent (requires constant supervision, assistance or cannot/is not gotten out of bed, or tube or parenterally fed) in either transfer or eating; dependent is defined as dependent in both transfer and eating.

4

Based on check list of medical conditions. 5-28

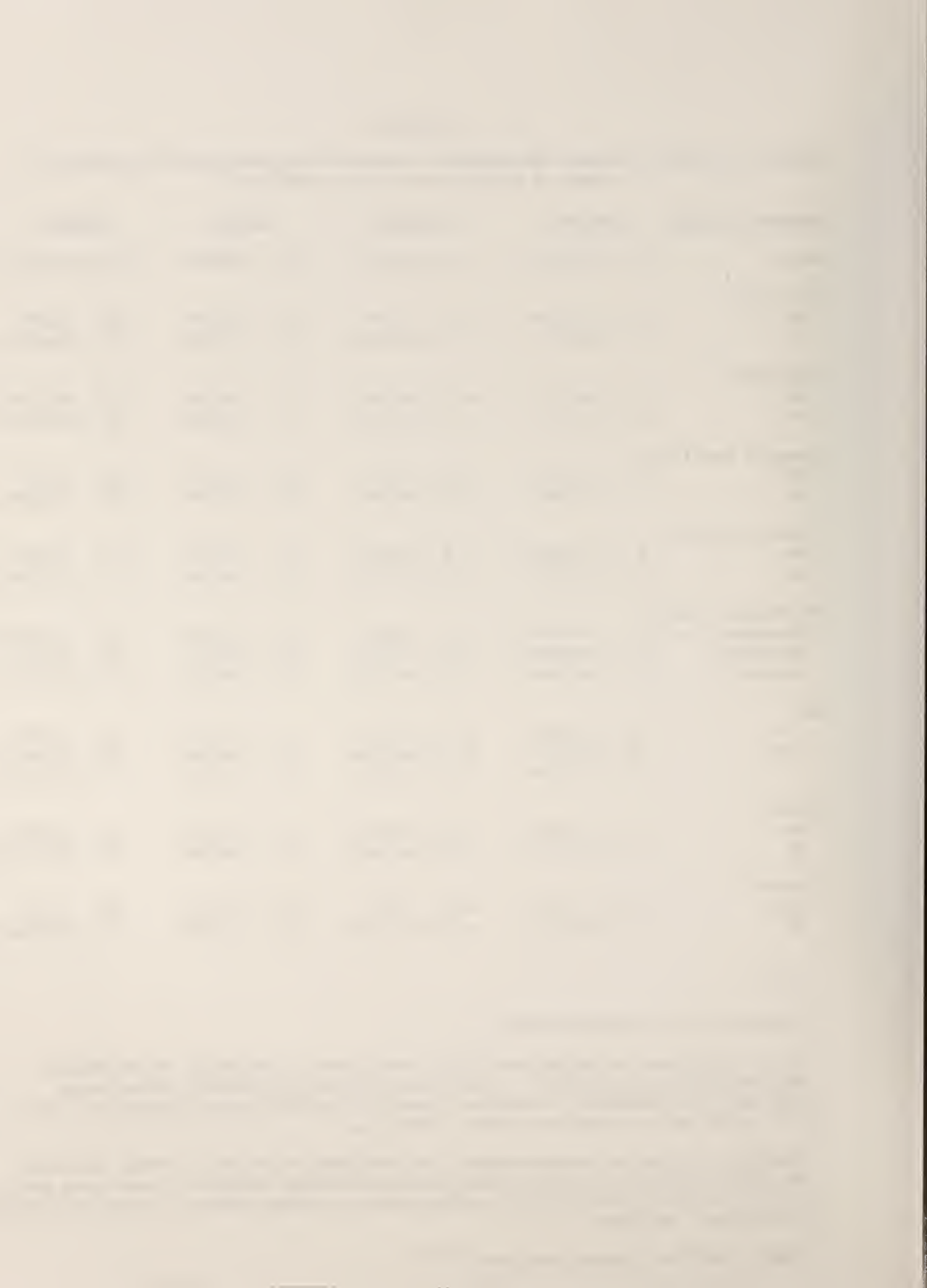


Table 5-11

Prevalence, maintenance, recovery, and incidence of decubitus ulcers over 6-month period for residents  
in a sample of nursing homes in New York State, 1986

<u>Independent Variable</u>	<u>Prevalence</u>	<u>Maintenance</u>	<u>Recovery</u>	<u>Incidence</u>
Overall	15.4 (1818/11795)	48.8 (632/1294)	51.2 (662/1294)	9.6 (788/8192)
1				
Hip Fracture				
Yes	20.1 (43/214)	30.3 (10/33)	69.7 (23/33)	9.2 (13/141)
No	15.3 (1775/11581)	49.3 (622/1261)	50.7 (639/1261)	9.1 (775/8051)
1				
Stroke/Plegia				
Yes	17.7 (215/1212)	47.5 (77/162)	52.5 (85/162)	9.2 (76/824)
No	15.1 (1603/10583)	49.0 (555/1132)	51.0 (577/1132)	9.7 (712/7368)
1				
Congestive Heart Failure				
Yes	10.4 (19/182)	30.0 (3/10)	70.0 (7/10)	9.6 (11/114)
No	15.5 (1799/11613)	49.0 (629/1284)	51.0 (655/1284)	9.6 (777/8078)
2				
Clinically Complex				
Yes	18.2 (299/1645)*	50.0 (108/216)	50.0 (108/216)	11.4 (122/1073)
No	15.0 (1519/10150)	48.6 (524/1078)	51.4 (554/1078)	9.4 (666/7119)
3				
ADL (Transfer & Eating)				
Independent	3.0 (68/2269)*	22.0 (11/50)*	78.0 (39/50)*	3.7 (67/1814)*
Intermediate	13.0 (593/4560)	40.9 (183/447)	59.1 (264/447)	9.2 (306/3314)
Dependent	23.3 (1157/4966)	55.0 (438/797)	45.0 (359/797)	13.5 (415/3064)
Age				
< 65	16.8 (101/601)	51.3 (40/78)	48.7 (38/78)	9.6 (40/415)
65-89	15.3 (1249/8157)	50.0 (448/896)	50.0 (448/896)	9.4 (534/5710)
90 +	15.4 (466/3028)	44.8 (143/319)	55.2 (176/319)	10.4 (214/2061)
4				
Diabetes				
Yes	18.8 (251/1336)	48.2 (81/168)	51.8 (87/168)	11.0 (94/857)
No	15.5 (960/6211)	47.5 (332/699)	52.5 (367/699)	9.8 (423/4330)
4				
Comatose				
Yes	55.3 (21/38)*	66.7 (3/12)	33.3 (4/12)	16.7 (2/12)
No	15.3 (1792/11743)	48.8 (624/1278)	51.2 (654/1278)	9.6 (782/8172)

\*

p < .001

1

Based on ICD-9 code of primary diagnosis.

2

RUG-II category which includes residents without severe behavioral problems who have the following treatments, diagnoses, or conditions: physician care one or more times per week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia.

3

Independent is defined as independent (needs no or intermittent supervision) in transfer and eating; intermediate is defined as dependent (requires constant supervision, assistance or cannot/is not gotten out of bed, or tube or parenterally fed) in either transfer or eating; dependent is defined as dependent in both transfer and eating.

4

Based on check list of medical conditions. 5-29

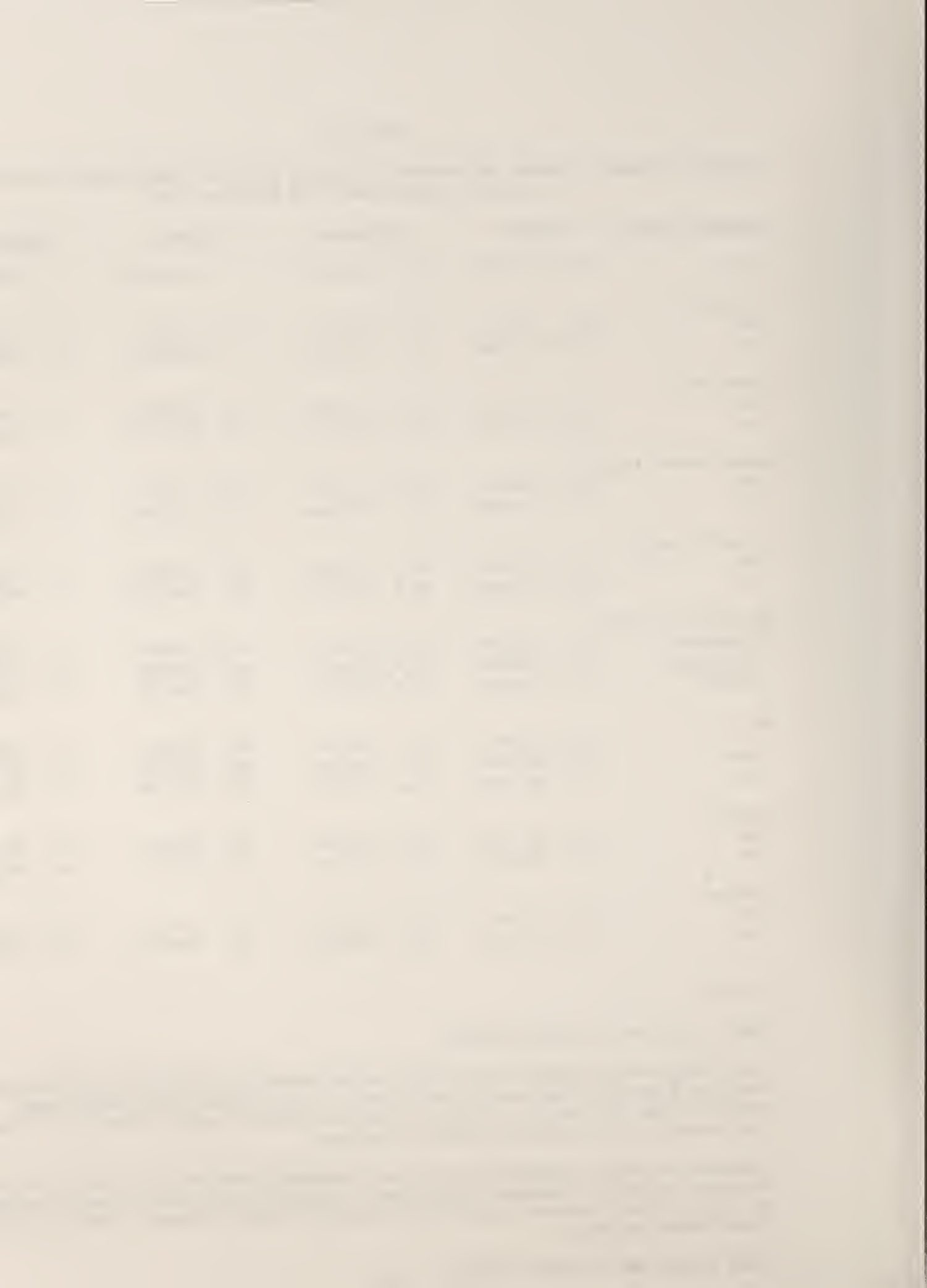




Table 5-12

Change in presence of decubitus ulcers for nursing home residents remaining in the facility, from a sample of nursing homes in New York State, 1986

TIME_1	TIME_2						ROW TOTAL	Died or Discharged
	None	Level One	Level Two	Level Three	Level Four	Level Five		
None	7404	270	339	114	63	2	8192 86.4	1785 (17.9)
Level One	241	131	44	11	4		431 4.5	132 (23.4)
Level Two	272	49	115	39	10	1	486 5.1	163 (25.1)
Level Three	113	14	24	50	25	4	230 2.4	119 (34.1)
Level Four	33	6	13	22	62		136 1.4	104 (43.3)
Level Five	3	1		2	3	2	11 .1	6 (35.3)
COLUMN TOTAL	8066 68.4	471 4.0	535 4.5	238 2.0	167 1.4	9 .1	9486 100.0	2309 (19.6)

THE HISTORY OF THE  
CITY OF BOSTON  
FROM THE FIRST SETTLEMENT TO THE PRESENT TIME  
IN TWO VOLUMES.  
BY NATHANIEL BENTLEY.  
LONDON: PRINTED BY J. JOHNSON, ST. PAUL'S CHURCH-YARD, 1787.

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THE FIRST PRISON OF THE CITY OF BOSTON, 1630.	4
THE FIRST HOSPITAL OF THE CITY OF BOSTON, 1630.	5
THE FIRST MARKET OF THE CITY OF BOSTON, 1630.	6
THE FIRST THEATRE OF THE CITY OF BOSTON, 1630.	7
THE FIRST GARDEN OF THE CITY OF BOSTON, 1630.	8
THE FIRST BRIDGE OF THE CITY OF BOSTON, 1630.	9
THE FIRST FORT OF THE CITY OF BOSTON, 1630.	10
THE FIRST BARRACKS OF THE CITY OF BOSTON, 1630.	11
THE FIRST ARMY OF THE CITY OF BOSTON, 1630.	12
THE FIRST NAVY OF THE CITY OF BOSTON, 1630.	13
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THE FIRST FOOT OF THE CITY OF BOSTON, 1630.	59
THE FIRST TOE OF THE CITY OF BOSTON, 1630.	60
THE FIRST NAIL OF THE CITY OF BOSTON, 1630.	61
THE FIRST SKIN OF THE CITY OF BOSTON, 1630.	62
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Table 5-13

Prevalence, maintenance, recovery, and incidence of urinary tract infections over 6-month period for residents in a sample of nursing homes in New York State, 1986

<u>Independent Variable</u>	<u>Prevalence</u>	<u>Maintenance</u>	<u>Recovery</u>	<u>Incidence</u>
Overall	13.0 (982/7543)	29.9 (227/759)	70.1 (532/759)	8.6 (456/5291)
1				
Hip Fracture				
Yes	10.8 (14/130)	22.2 (2/9)	77.8 (7/9)	3.3 (3/90)
No	13.1 (968/7413)	30.0 (225/750)	70.0 (525/750)	8.7 (453/5201)
1				
Stroke/Plegia				
Yes	14.4 (120/833)	23.1 (21/91)	76.9 (70/91)	8.7 (50/577)
No	12.8 (862/6710)	30.8 (206/668)	69.2 (462/668)	8.6 (406/4714)
Catheter				
Yes	41.6 (344/826)*	43.9 (108/246)*	56.1 (138/246)*	21.3 (72/338)*
No	9.4 (638/6717)	23.2 (119/513)	76.8 (394/513)	7.8 (384/4953)
Female				
Yes	13.0 (770/5909)	28.5 (173/607)	71.5 (434/607)	8.7 (362/4166)
No	13.0 (212/1634)	35.5 (54/152)	64.5 (98/152)	8.4 (94/1125)
2				
ADL (Transfer & Eating)				
Independent	5.0 (69/1393)*	26.3 (15/57)	73.7 (42/57)	5.4 (58/1079)*
Intermediate	12.7 (370/2908)	31.2 (94/301)	68.8 (207/301)	8.5 (178/2095)
Dependent	16.7 (543/3242)	29.4 (118/401)	70.6 (283/401)	10.4 (220/2117)
Age				
< 65	18.1 (77/426)	41.7 (25/60)	58.3 (35/60)	9.7 (28/289)
65-89	12.8 (663/5189)	29.7 (154/518)	70.3 (364/518)	8.7 (320/3679)
90 +	12.5 (240/1923)	26.7 (48/180)	73.3 (132/180)	8.2 (108/1321)
3				
Diabetes				
Yes	16.4 (219/1332)*	36.1 (57/158)	63.9 (101/158)	9.6 (83/863)
No	12.3 (763/6211)	28.3 (170/601)	71.7 (431/601)	8.4 (373/4428)
3				
Comatose				
Yes	25.9 (7/27)	50.0 (2/4)	50.0 (2/4)	14.3 (2/14)
No	13.0 (974/7511)	29.7 (224/754)	70.3 (530/754)	8.6 (454/5274)

\*

p < .001

1

Based on ICD-9 code of primary diagnosis.

2

Independent is defined as independent (needs no or intermittent supervision) in transfer and eating; intermediate is defined as dependent (requires constant supervision, assistance or cannot/is not gotten out of bed, or tube or parenterally fed) in either transfer or eating; dependent is defined as dependent in both transfer and eating.

3

Based on check list of medical conditions.

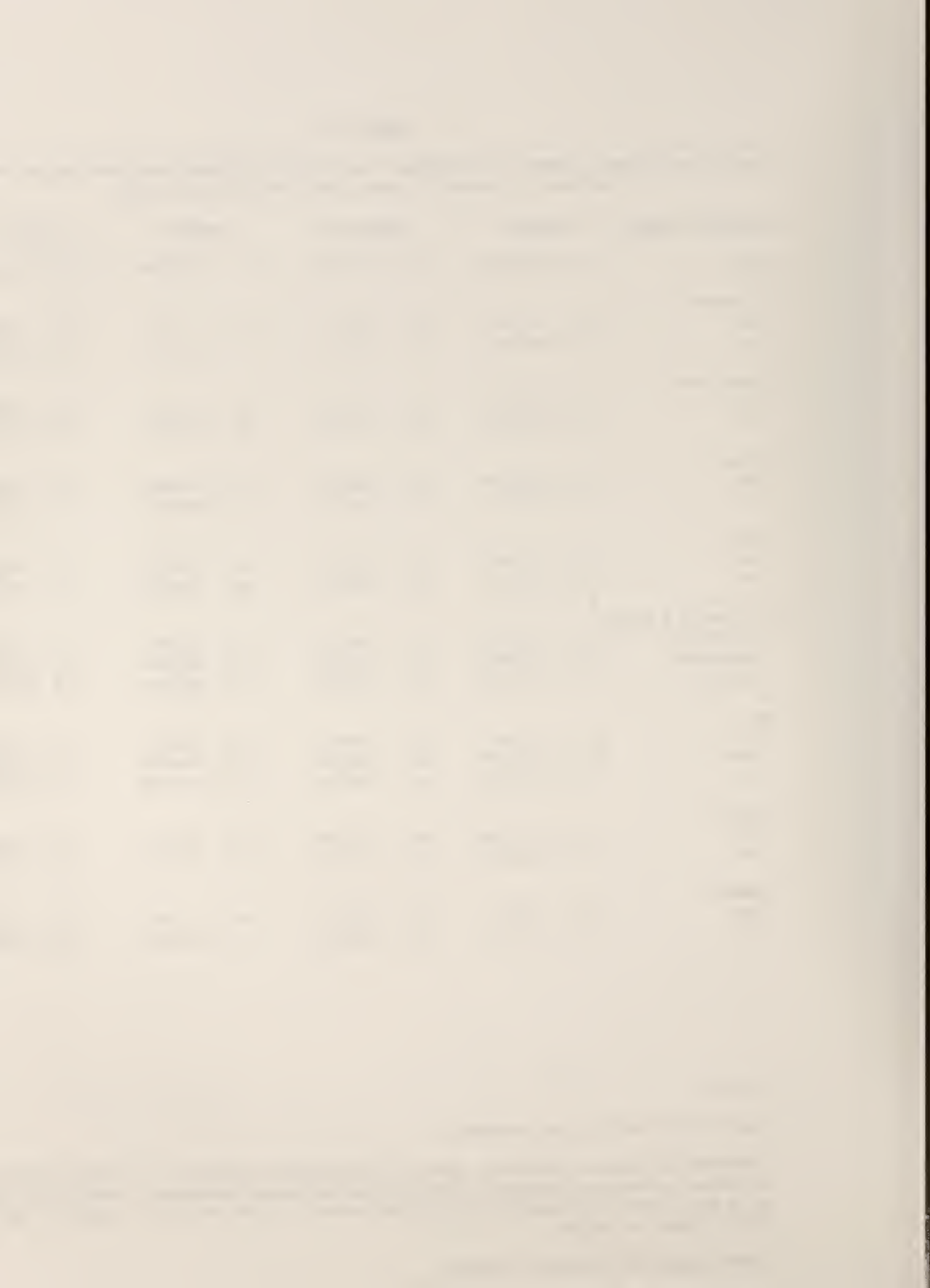


Table 5-14

Prevalence, maintenance, discontinuation, and incidence of bladder/bowel training over 6-month period  
for residents in a sample of nursing homes in New York State, 1986

<u>Independent Variable</u>	<u>Prevalence</u>	<u>Maintenance</u>	<u>Discontinued</u>	<u>Incidence</u>
Overall	1.6 (121/7546)	1.0 (1/98)	99.0 (97/98)	0.2 (14/5955)
1				
Hip Fracture				
Yes	2.3 (3/130)	0.0 (0/1)	100.0 (1/1)	0.0 (0/98)
No	1.6 (118/7416)	1.0 (1/97)	99.0 (96/97)	0.2 (14/5857)
1				
Stroke/Plegia				
Yes	1.7 (14/833)	0.0 (0/11)	100.0 (11/11)	0.5 (3/657)
No	1.6 (107/6713)	1.1 (1/87)	98.9 (86/87)	0.2 (11/5298)
2				
ADL (Transfer & Eating)				
Independent	0.6 (9/1393)	0.0 (0/8)	100.0 (8/8)	0.4 (5/1128)
Intermediate	1.8 (53/2910)	2.2 (1/45)	97.8 (44/45)	0.3 (8/2353)
Dependent	1.8 (59/3243)	0.0 (0/45)	100.0 (45/45)	0.0 (1/2474)
Age				
< 65	1.6 (7/426)	0.0 (0/7)	100.0 (7/7)	0.0 (0/342)
65-89	1.4 (73/5192)	1.8 (1/57)	98.2 (56/57)	0.2 (10/4143)
90 +	2.1 (41/1923)	0.0 (0/34)	100.0 (34/34)	0.3 (4/1467)

\*

p < .001

1

Based on ICD-9 code of primary diagnosis.

2

Independent is defined as independent (needs no or intermittent supervision) in transfer and eating; intermediate is defined as dependent (requires constant supervision, assistance or cannot/is not gotten out of bed, or tube or parenterally fed) in either transfer or eating; dependent is defined as dependent in both transfer and eating.



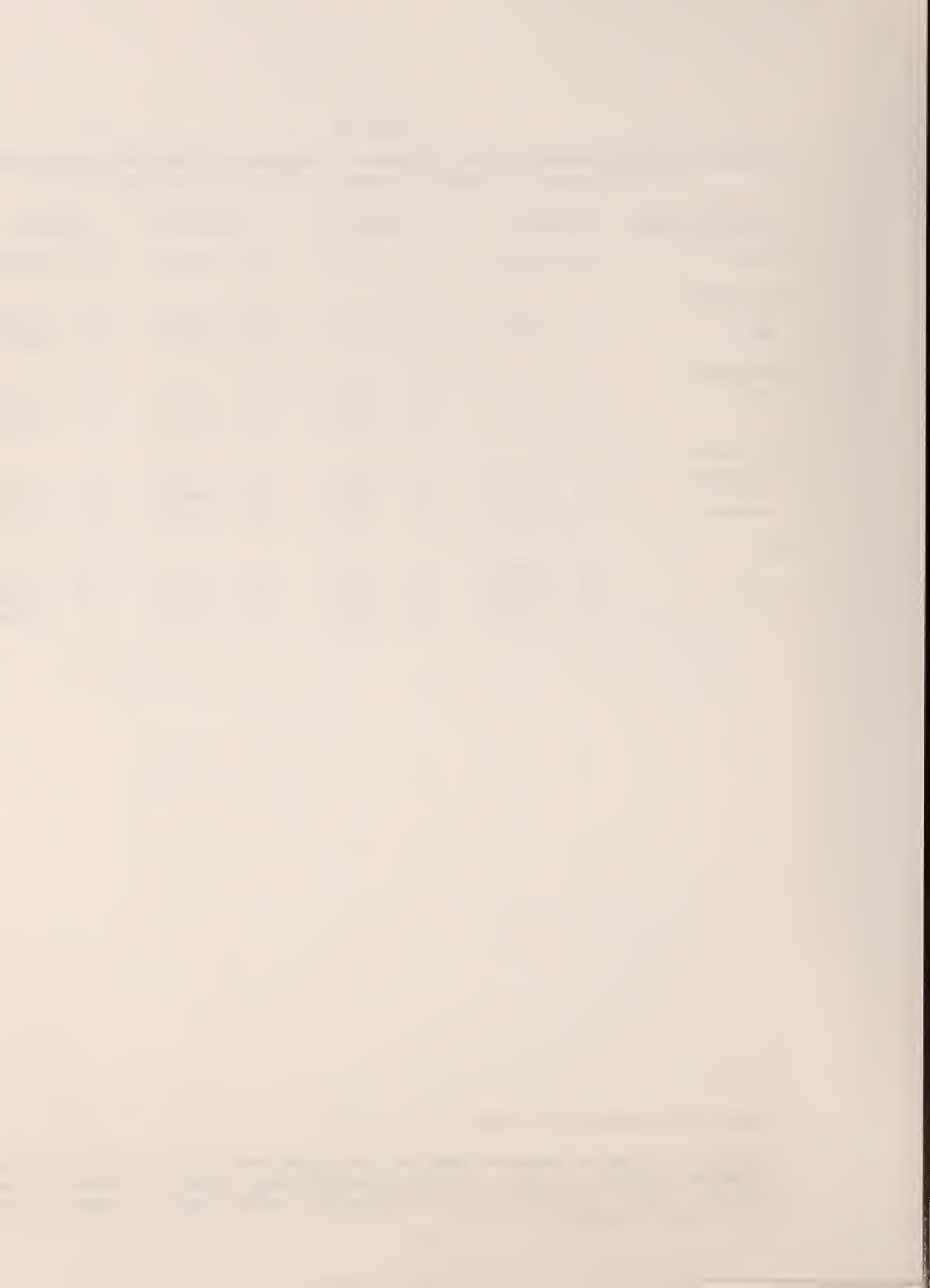


Table 5-15

Prevalence, maintenance, discontinuation, and incidence of use of physical restraints over 6-month period for residents in a sample of nursing homes in New York State, 1986

<u>Independent Variable</u>	<u>Prevalence</u>	<u>Maintenance</u>	<u>Discontinued</u>	<u>Incidence</u>
Overall	56.9 (4295/7548)	92.9 (3158/3401)	7.1 (243/3401)	22.6 (601/2654)
1				
Hip Fracture				
Yes	47.7 (62/130)	83.0 (39/47)	17.0 (8/47)	21.2 (11/52)
No	57.1 (4233/7418)	93.0 (3119/3354)	7.0 (235/3354)	22.7 (590/2602)
2				
ADL (Transfer & Eating)				
Independent	7.4 (103/1394)*	63.8 (51/80)*	36.2 (29/80)*	11.3 (119/1057)*
Intermediate	56.2 (1635/2911)	89.7 (1204/1342)	10.3 (138/1342)	23.7 (251/1057)
Dependent	78.8 (2557/3243)	96.2 (1903/1979)	3.8 (76/1979)	42.8 (231/540)
Age				
< 65	45.8 (195/426)*	89.8 (150/167)	10.2 (17/167)	30.2 (55/182)
65-89	55.7 (2895/5194)	92.8 (2143/2309)	7.2 (166/2309)	21.3 (404/1893)
90 +	62.5 (1202/1923)	93.5 (864/924)	6.5 (60/924)	24.6 (142/577)
3				
Diabetes				
Yes	53.6 (716/1336)	92.8 (499/538)	7.2 (39/538)	21.8 (106/487)
No	57.6 (3578/6211)	92.9 (2658/2862)	7.1 (204/2862)	22.8 (495/2167)

\*

p < .001

1

Based on ICD-9 code of primary diagnosis.

2

Independent is defined as independent (needs no or intermittent supervision) in transfer and eating; intermediate is defined as dependent (requires constant supervision, assistance or cannot/is not gotten out of bed, or tube or parenterally fed) in either transfer or eating; dependent is defined as dependent in both transfer and eating.

3

Based on check list of medical conditions.



## CHAPTER 6

### ANALYSIS OF TEXAS MEDICAID NURSING HOME RESIDENT OUTCOMES

#### Methods

##### Data collection system

The Texas Department of Human Services collects data on Medicaid clients in all nursing homes in the state. The assessments are used to determine the level of care for reimbursement. Residents are assessed in the facility by the admitting or attending physician and the data are forwarded to the Texas Department of Health for data entry. Residents are periodically assessed at intervals of approximately six months.

The assessment forms (Form 3652/3) that were used to collect the data on these residents contain abbreviated coding instructions on the reverse side. A copy of this form is included in Appendix A. There is, in addition, a coding manual which contains more complete definitions and coding instructions. However, according to the staff of the Texas Nursing Home Case-Mix Project, few of the assessors refer to the coding manual.

##### Verification and use of the data

Only the resident's client identification number (PCN) or social security number (SSN), the facility's unique vendor number, and the resident's level of care are audited and verified by the state. These items are used to determine the proper level of Medicaid reimbursement for each resident.

After the initial assessment, a central processing unit generates a new assessment form pre-printed with the values of the initial assessment. Updates are made on this pre-printed assessment. Based on information from the Texas Nursing Home Case-Mix Project and the results of our preliminary analyses of these data, we have found that it is not unusual for a facility to fail to update information, especially that relating to activities of daily living. The clinical and service-related items are more accurately assessed; these items are used by the Texas Department of Health for the purposes of quality assurance.

##### Development of analytic files

The Texas Department of Human Services provided us with data on 140,120 Texas Medicaid clients who were residents in nursing homes in Texas during the period from 1984 to 1986. These data represent 1,309 different facilities.

##### Record types

Each resident in the file has one header record, which identifies the client by social security number (SSN) and client identification number (PCN), scrambled in this file to preserve confidentiality. The second record type is a patient transaction notice, which is used to collect information on admissions, discharges, including those discharged dead, and transfers. There are a variable number of these records per person. A copy of the transaction notice form is contained in Appendix A.





Thirdly, a level of care assessment record provides limited demographic information and information about residents' health and functional status. Residents are assessed at admission and then at intervals of roughly six months during the course of a stay in the nursing home. Residents newly admitted to the Medicaid system appear to be assessed irregularly; those with relatively longer lengths of stay generally adhere to this six-month pattern.

The final record type is a death certificate, included for some of those residents who died while they were Medicaid-covered nursing home residents. These death records were selected from a file of death certificates filed during the time period covered by these data by matching the SSNs on the death certificates to those on the transaction and assessment notices. A substantial proportion of the residents in the file had incorrect or missing SSNs assigned to their records; when a SSN was unknown or did not exist, a railroad retirement, health insurance code, or random PCN was assigned. Consequently, the file contains death certificates for only about half of residents indicated by transaction notices to have died in a nursing home. The death certificates were not used in these analyses.

#### Chronology of records

The master data file contains each type of record for a slightly different period of time. Transaction data are included for 1984, 1985, 1986 and January through April 1987, but these data are complete only through October 1986. Assessment records are included from July 1984 through July 1986.

#### Sampling

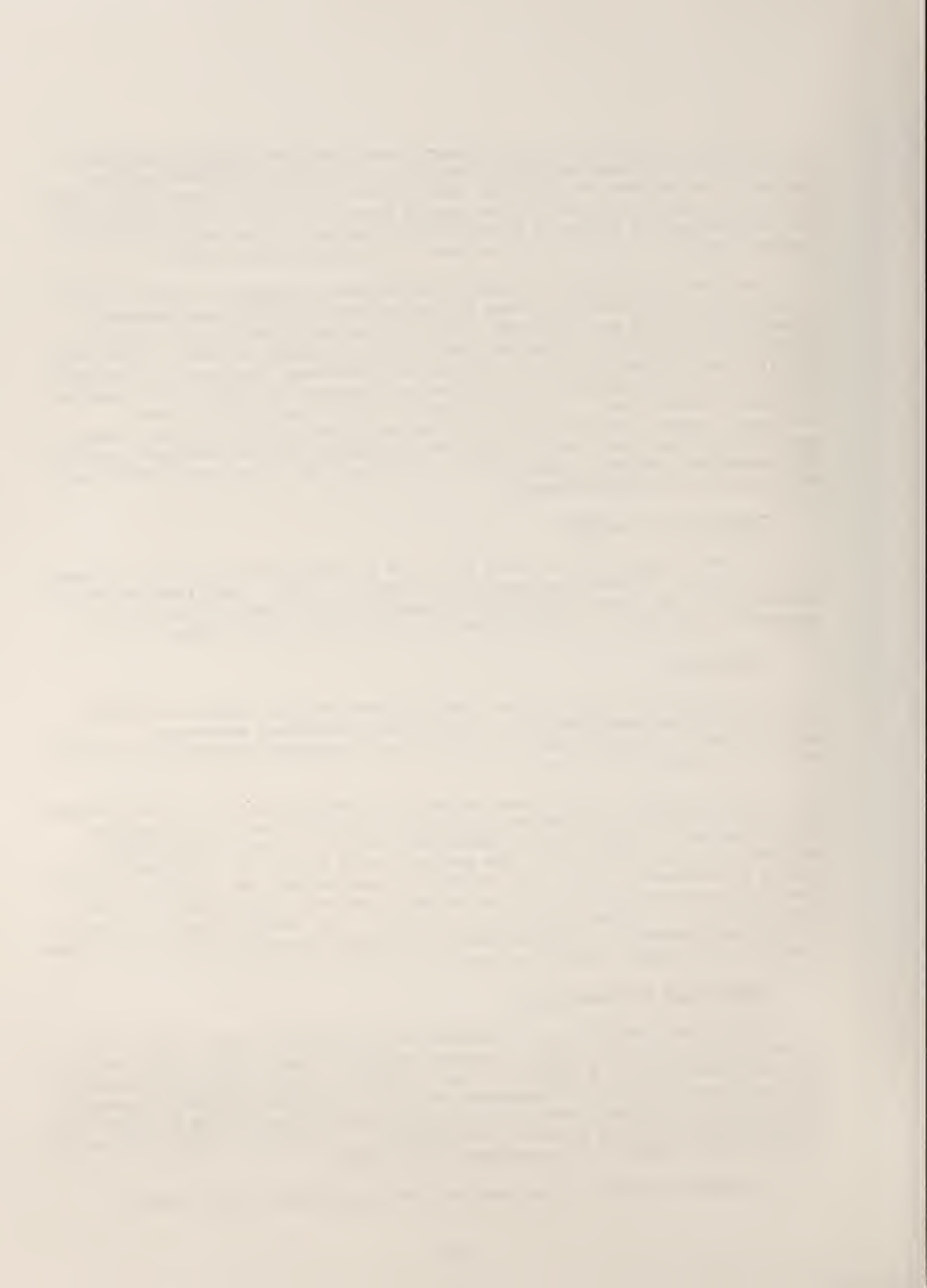
The process of sampling these data involved several steps; the overall objective was the development of a sample file containing assessments approximately six months apart for all Medicaid-covered residents in a randomly selected group of facilities.

The first step was the random selection of 60 facilities. It was assumed that, upon analysis, it might be necessary to exclude some of the selected facilities due to their lack of appropriate data (i.e. lack of assessment records during an appropriate time period), and a minimum of fifty facilities should be retained. All of the records for each patient who was ever in one of the 60 randomly selected facilities at any point were identified. This file contained 39,360 records for 9,641 residents. There were a variable number of records per patient: the median number of transaction notices was 3, the median number of assessment records was also 3.

#### Preparation of sample file

Preliminary analyses were conducted on this sample to both examine and clean the data. These analyses included checks for consistency, skip patterns, and the examination of a series of case listings. These analyses indicated that many residents had no assessment records; others had only one assessment. Many of those residents whose transaction notices indicated that they had died in the nursing home had no death certificates. In addition, only a portion of residents had records from coincident time periods.

In order to create a file that was more appropriate to the planned



analyses, a second sampling process was undertaken. This second sample was not to include death certificates, as their inclusion was incomplete and they would not add substantially to the information provided by the transaction notices. This second stage of sampling examined the 60-facility file to search for records dated between July 1, 1984 and July 1, 1986, the time period for which assessment and transaction records are both available. Those whose initial assessment was dated after November 1, 1985 and those for whom the file contained no assessment records, were considered ineligible for inclusion into the study; these residents were not examined further.

To be included in the sample, a resident had to have either two assessment records dated four to eight months apart, or an assessment record followed within eight months by a transaction record indicating a death or discharge. In order to provide a sufficient period of time for these intervals, the first assessment had to be dated before November 1, 1985. The resulting file contained 4,512 residents in 57 facilities. Forty-four percent of these residents were dead or discharged by Time 2; 56 percent remained in the nursing home and were assessed at Times 1 and 2.

#### Examination for bias in sampling

A substantial number of residents from the initial (n=9,641) sample file were excluded from the final sample. Residents who had at least one assessment record in the appropriate time period but were not selected for the final sample were compared to those in the final sample for potential biases resulting from the sampling process. Three categories of residents were compared: the two final-sample groups (those with two assessments as well as those with an assessment followed by a death or discharge) and the group of those who had only one measurement within the appropriate time period. Comparisons between these groups were made on demographic characteristics and the functional, clinical and service items used in the subsequent analyses.

There appears to have been no systematic bias in the selection of residents to be included in the final sample. The only significant difference between those residents excluded from the final sample because they had no Time 2 record and the two final sample groups (those with two assessments and those with a Time 1 assessment and a discharge) is in their length of stay. Those excluded from the final sample had substantially shorter lengths of stay. This difference is both understandable and insignificant with respect to our analyses. Given that the timing of assessments appears to become more regular with lengthening stays, it is probable that residents who were newly admitted or new to the Medicaid system are not assessed as regularly as are those who have been longer-term residents. Since there were no significant differences in the clinical and functional variables of interest, this difference in length of stay would not result in biases that would affect our analyses.

#### Variable selection and construction

A number of the variables necessary for analysis were available on the Texas assessment instrument, and were retained in their original form. Several additional items were constructed from information recorded on the assessment instrument.





### Diagnosis codes

The assessment form lists up to five current diagnoses according to ICD-9 codes; these codes were used in the creation of five additional variables: urinary tract infection, congestive heart disease, hip fracture, stroke/plegia, diabetes. A resident was coded as having one of these conditions if his or her assessment form had the code for the condition among the listed diagnoses.

### Recoded and combined items

Additional categories were added to both the continence and feeding items. The continence item was modified to include information on residents who were catheterized. Using the urinary tract care item, residents were classified as to whether or not they were catheterized, with responses of 1 through 4 (catheter PRN, Foley indwelling, suprapubic, 3-way irrigation, respectively) coded as catheterized and 0 (none) coded as not catheterized. Residents who were not catheterized retained their original codings on the continence item. Those who were catheterized were coded in a new category, 5=catheterized, on the continence item, and their original continence score was discounted. The resulting continence item was scored as follows:

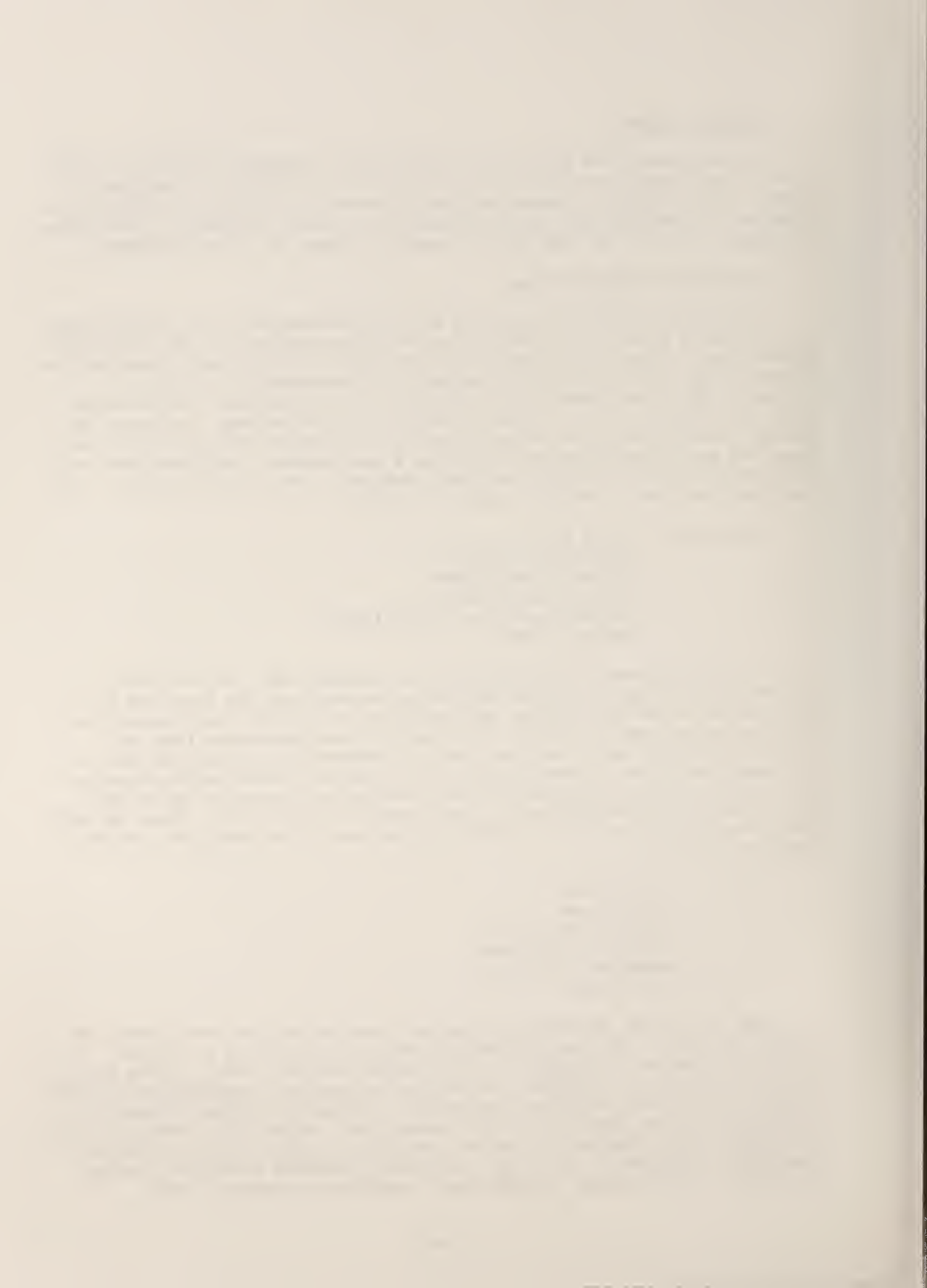
Incontinence: 0=None noted  
1=Assistance required  
2=Urinary incontinence  
3=Fecal incontinence  
4=Urinary and fecal incontinence  
5=Catheterized.

A similar process was performed on the feeding item. An additional category was created to provide information on residents who were tube fed. The information on tube feeding was taken from the non-oral nourishment item, with residents coded 1, 2 and 4 (nasogastric tube, gastrostomy tube and hyperalimentation and/or catheter therapy, respectively) considered tube-fed and those coded 0 or 3 (none ordered and IV fluids, respectively) considered not tube-fed. Those residents who were tube-fed were reclassified as tube fed on the eating item instead of their original eating score. Those who were not tube-fed retained their original feeding score. The resulting item was coded as follows:

Eating: 0=Independent  
1=Supervised  
2=Minimum assistance  
3=Moderate assistance  
4=Maximum assistance  
5=Tube fed.

The three-level ADL summary score was constructed from the transfer and eating variables. The most independent category was created to include residents coded as independent in both transferring and eating. Codes of 0, 1 and 2 (independent, supervised, and minimum assistance, respectively) on both of these items were considered independent. The most dependent category contains residents dependent in both transfer and eating, with codes of 3 and 4 on transferring (moderate and maximum assistance, respectively) considered dependent, and codes of 3, 4, and 5 on eating (moderate assistance, maximum assistance, and tube-fed, respectively), considered dependent. The





intermediate category contains residents who did not meet the criteria for either of the other categories.

Two items were recoded dichotomously for use in these analyses. A mental status variable distinguishing between residents who were not disoriented and those who were disoriented was created from the orientation/memory item. Residents coded 0=aware/mental clarity and 1=aware if reminded/with assistance were recoded as not disoriented, and those coded 2=moderate impairment, 3=severe impairment, and 4=incoherent were considered disoriented.

Similarly, a yes/no comatose variable was created from the consciousness item. Residents coded 0=alert wakefulness, 1=listlessness, apathy, 2=lethargy, and 3=semi-coma were recoded as having no coma. Those coded 4=coma on the consciousness item were considered to have coma in these analyses.

#### Missing items

After a considerable amount of effort, we concluded that it would not be possible to construct the 16-category RUG-II scale from the Texas assessment data. Eleven items are required to construct this scale. Of these eleven, two (oxygen therapy and wound/lesion care) are readily available from the Texas assessments. The prevalence of four additional items (chemotherapy, cerebral palsy, urinary tract infections and hemiplegia) can be estimated from the presence of corresponding medication and diagnosis codes. It is likely that the use of these codes would result in an underestimation of the prevalence of these items due to the fact that only up to five medications and diagnoses are recorded, and these items are not updated frequently. The remaining five items (dehydration, internal bleeding, terminally ill, stasis ulcer, physician care at least weekly) are not available from the Texas assessment data. Since so many of the required items are not available, and several of those which are available only provide estimates of actual prevalences, neither the RUG-II scale nor the clinically complex category were used in the Texas analyses.

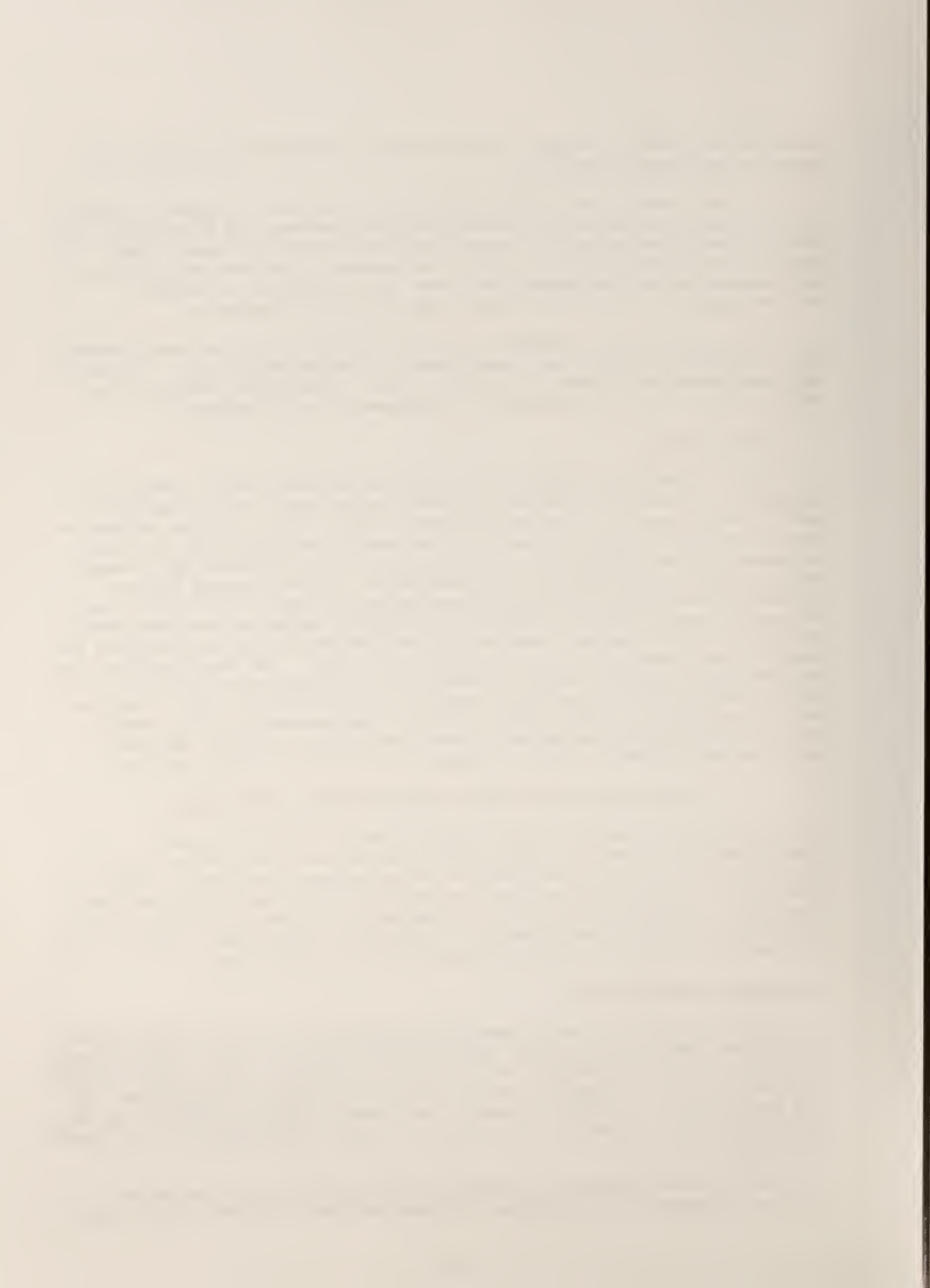
#### Description of the Texas Medicaid Nursing Home Sample

The following section of this report presents a cross-sectional description of the sample of Medicaid-covered residents of nursing homes in Texas, based on the values recorded in the assessments performed at Time 1 of this study. In addition, data on demographic, clinical and service-related items from a cross-sectional sample of residents provided by the Texas Nursing Home Case-Mix Project are presented for purposes of comparison. Table 6-1, at the end of this chapter, presents these data in a tabular form.

#### Demographic characteristics

The Texas Medicaid sample contains assessments for 4,512 residents in 57 facilities. Most of these (86%) are classified as ICF residents; the remaining 14 percent are SNF residents. The majority of residents in this sample (68.8%) were between 65 and 89 years of age at the time of their first assessment in the sample file. The under 65 years of age category was the smallest (10.7%), with 20.5 percent 90 years of age or over. Seventy-three percent of the sample was female.

In the Texas Nursing Home Case-Mix Project, Medicaid was the primary source of payment for 53.5 percent of these residents; the second most common



source of payment was private pay (25.0%). A combination of Medicare and Medicaid provided payment for 11.6 percent of the sample. Just over three-quarters of the Case-Mix sample were under 90 years of age; 23.7 percent were over 90 years of age. Approximately one-quarter were male; 76.0 percent were female.

The age and sex distributions in the two samples are very similar, with differences across categories of less than three percent. The primary demographic difference between the samples is in the source of payment. All of the residents in the Texas Medicaid sample are covered by Medicaid, and about half of the residents in the Case-Mix sample are Medicaid-covered.

#### Discharge status

Of the 4,512 residents in the Texas Medicaid sample, 1,986 residents (44%) did not remain in the facility for a second assessment; these residents either died or were discharged during the six month study period. The largest proportion (29.0% of the sample) was discharged to a hospital; only 3.4 percent went home. Six percent were discharged dead, and 5.6 percent were discharged to another nursing home or institution.

#### Physical functioning

All Medicaid-covered residents in nursing homes in Texas are assessed periodically to determine, among other things, their level of physical functioning. The data presented here reflect only the ADL status at the time of the first assessments; change in ADL status over the course of the study period are not presented. This deviation from the methodology used in the other data sets examined in this project is required due to a lack of confidence in the accuracy of the ADL change data, due to the inconsistency in updating assessments.

The instruments on which these assessments are performed in Texas are referred to as "turnaround" forms. The major incentive to update these pre-printed assessment is the potential increase in reimbursement rates that could result from a change in a resident's status. In Texas, Medicaid reimbursement rates are based solely on the resident's level of care (ICF or SNF). Unless a change in status is severe enough to result in a change in level of care, it is unlikely that changes would be reported; the values of the initial assessment would then be retained. In preliminary analyses of functional change performed on these data, it was found that the ADL items were extremely stable over the course of the study period, and that when there was a change, it was often quite dramatic.

In order to examine the validity of the cross-sectional information, comparable information collected independently by the Texas Nursing Home Case-Mix Project are presented. This project involved two sets of data collection: the first, in January 1986, included 1,997 residents in 48 nursing homes; the second, in June 1987, included 1,380 residents in 36 nursing homes. The first sample is used here, since it is chronologically closer to this project's 1985 sample.

#### Feeding

The Texas Medicaid assessment instrument defines eating as







"consuming/ingesting solid and liquid food by mouth. May include syringe feeding." We combined this item with the "non-oral nourishment" item to create a separate category for residents who were tube fed. The resulting options for coding are the following: 0) independent: resident is able to perform the activity without any supervision or assistance, 1) supervised: resident is able to perform the task/activity with direction and encouragement, 2) minimal assistance: resident is able to perform the task/activity with some assistance, but is able to do most by him/herself, 3) moderate assistance: resident is able to participate to a degree in the task completion, but the staff performs the major part of the actual task/activity, 4) maximum assistance: the staff is performing all of the actual tasks/activities for the resident and 5) tube fed.

The non-oral nourishment item was used to identify residents who were tube fed. The majority of residents (93.2%) received no non-oral nourishment; 5.2 percent had naso-gastric tubes, 1.2 percent gastrostomy tubes and 0.2 percent hyperalimentation or Hickman catheters. These latter three categories were combined to form the "tube-fed" category (6.6%). The 0.2 percent who received IV fluids were considered not tube-fed.

As is indicated in Table 6-1, 34.8 percent of these residents were assessed as independent in feeding. The supervised, minimal and moderate assistance categories, combined to identify those residents who require help with feeding, contain 42.1 percent of the sample. Slightly fewer than one quarter of the residents were assessed as unable to feed (the maximum assistance and tube fed groups combined).

The Texas Nursing Home Case-Mix Project utilized a different assessment instrument, and the options for coding are somewhat different. The categories have been combined in Table 6-1 to make them relatively comparable to those in the Medicaid sample. The proportion of residents evaluated as unable to feed was similar in the two Texas nursing home data sets (23.1% in the Medicaid sample and 25.5% in the Case-Mix sample). There were 13.8 percent more residents from the Case-Mix sample in the independent category than in the Medicaid sample. This difference may reflect a variation in the composition of the samples, but is more likely an artifact of different interpretations of the meaning of "independent".

#### Ability to transfer

The Texas Medicaid instrument defines transferring as "the act of moving from bed to chair, bed to commode, etc." The options for coding are the following: 0) independent: resident is able to perform the activity without any supervision or assistance 1) supervised: resident is able to perform the task/activity with direction and encouragement 2) minimal assistance: resident is able to perform the task/activity with some assistance, but is able to do most by him/herself 3) moderate assistance: resident is able to participate to a degree in the task completion, but the staff performs the major part of the actual task/activity 4) maximum assistance: the staff is performing all of the actual tasks/activities for the resident.

Those independent in transfer comprised 23.4 percent of the Medicaid sample. The proportions of residents requiring minimum or moderate assistance to transfer and maximum assistance were approximately the same, 37.2 percent and 39.4 percent, respectively. The three-level summary ADL item which was constructed from the eating and transfer items for use as a potential case-mix

1. The first part of the report deals with the general situation of the country and the progress of the work during the year. It is divided into two main sections: the first section deals with the general situation of the country and the progress of the work during the year, and the second section deals with the results of the work during the year.

2. The second part of the report deals with the results of the work during the year. It is divided into two main sections: the first section deals with the results of the work during the year, and the second section deals with the results of the work during the year.

3. The third part of the report deals with the results of the work during the year. It is divided into two main sections: the first section deals with the results of the work during the year, and the second section deals with the results of the work during the year.

4. The fourth part of the report deals with the results of the work during the year. It is divided into two main sections: the first section deals with the results of the work during the year, and the second section deals with the results of the work during the year.

5. The fifth part of the report deals with the results of the work during the year. It is divided into two main sections: the first section deals with the results of the work during the year, and the second section deals with the results of the work during the year.

6. The sixth part of the report deals with the results of the work during the year. It is divided into two main sections: the first section deals with the results of the work during the year, and the second section deals with the results of the work during the year.

7. The seventh part of the report deals with the results of the work during the year. It is divided into two main sections: the first section deals with the results of the work during the year, and the second section deals with the results of the work during the year.

8. The eighth part of the report deals with the results of the work during the year. It is divided into two main sections: the first section deals with the results of the work during the year, and the second section deals with the results of the work during the year.

9. The ninth part of the report deals with the results of the work during the year. It is divided into two main sections: the first section deals with the results of the work during the year, and the second section deals with the results of the work during the year.

adjuster indicated that 41.3 percent of the sample was independent in both items, 25.6 percent intermediate, and 33.1 percent dependent in both items (See Table 6-1).

Just over one quarter (28.5%) of the Texas Case-Mix Project's sample was evaluated as transferring independently. If the intermittent supervision and requires one person groups are combined to indicate those residents who require help in transferring, this combined group contains 34.7 percent of the sample. The remaining two categories - requires two people and bedfast - can be considered to contain those residents unable to transfer; this combined category contains 36.7 percent of the sample.

Although there is poor correlation between individual coding categories for these two samples, when the coding categories are combined into three levels, the distributions of residents in the two samples are similar. In the Case-Mix sample, the independent category contains about five percent more residents than in the Medicaid sample.

### Mobility

The Texas Medicaid instrument defines mobility as "mobility, moving safely, efficiently, and comfortably from one place to another, by walking or some mode of transportation." It should be noted that this measure combines walking and wheeling into a single measure of mobility; it is not possible to distinguish between those who walk independently, for example, and those who wheel independently. The options for coding are the following: 0) independent: resident is able to perform the activity without any supervision or assistance, 1) supervised: resident is able to perform the task/activity with direction and encouragement, 2) minimal assistance: resident is able to perform the task/activity with some assistance, but is able to do most by him/herself, 3) moderate assistance: resident is able to participate to a degree in the task completion, but the staff performs the major part of the actual task/activity, and 4) maximum assistance: the staff is performing all of the actual tasks/activities for the resident.

One-fifth of the Medicaid sample was assessed as independent in mobility. When the intermediate categories are combined, 43.9 percent of the sample is classified as needing some help in transferring. The maximal assistance group, considered here as containing those residents unable to transfer, contains 35.5 percent of the sample.

The item used to collect information on mobility in the Texas Case-Mix Project's data set separates walking and wheeling, assessing residents with respect to their actual method of moving about. The frequencies of responses are indicated in Table 6-1; the categories are being combined here in order to facilitate a comparison with the Medicaid sample. The proportion independent in mobility - walking independently and wheeling independently combined - was 28.6 percent. The proportion requiring some assistance in mobility - the walks with intermittent supervision, walks with one person, and walks with two persons groups - was 31.9 percent. Finally, 39.5 percent was wheeled or bedfast.

As was the case with the previously discussed ADL items, a greater proportion of the Case-Mix sample was assessed as independent than the Medicaid sample. A smaller proportion of the Case-Mix sample is classified in the





intermediate group. These variations are rather small, however (8 and 12 percent, respectively).

### Toileting

The Texas Medicaid assessment instrument defines toileting as "getting to and from bathroom or bedside commode; includes cleaning self, adjusting clothes." The options for coding are the following: 0) independent: resident is able to perform the activity without any supervision or assistance, 1) supervised: resident is able to perform the task/activity with direction and encouragement, 2) minimal assistance: resident is able to perform the task/activity with some assistance, but is able to do most by him/herself, 3) moderate assistance: resident is able to participate to a degree in the task completion, but the staff performs the major part of the actual task/activity, and 4) maximum assistance: the staff is performing all of the actual tasks/activities for the resident.

Slightly less than one-quarter (22.4%) of the Medicaid sample was assessed as toileting independently. The combined groups of residents requiring some help with toileting contained 32.8 percent of this sample; 44.7 percent were required maximal assistance. Maximal assistance is the most dysfunctional category on the Medicaid assessment instrument; it includes residents who are not toileted.

In the Texas Case-Mix sample, 28.0 percent of the residents were assessed as toileting independently. One quarter of these residents required assistance with toileting (the intermittent and constant supervision groups combined). The total assistance and not toileted groups, when combined into one group of those residents unable to toilet, contained 47.4 percent of the sample.

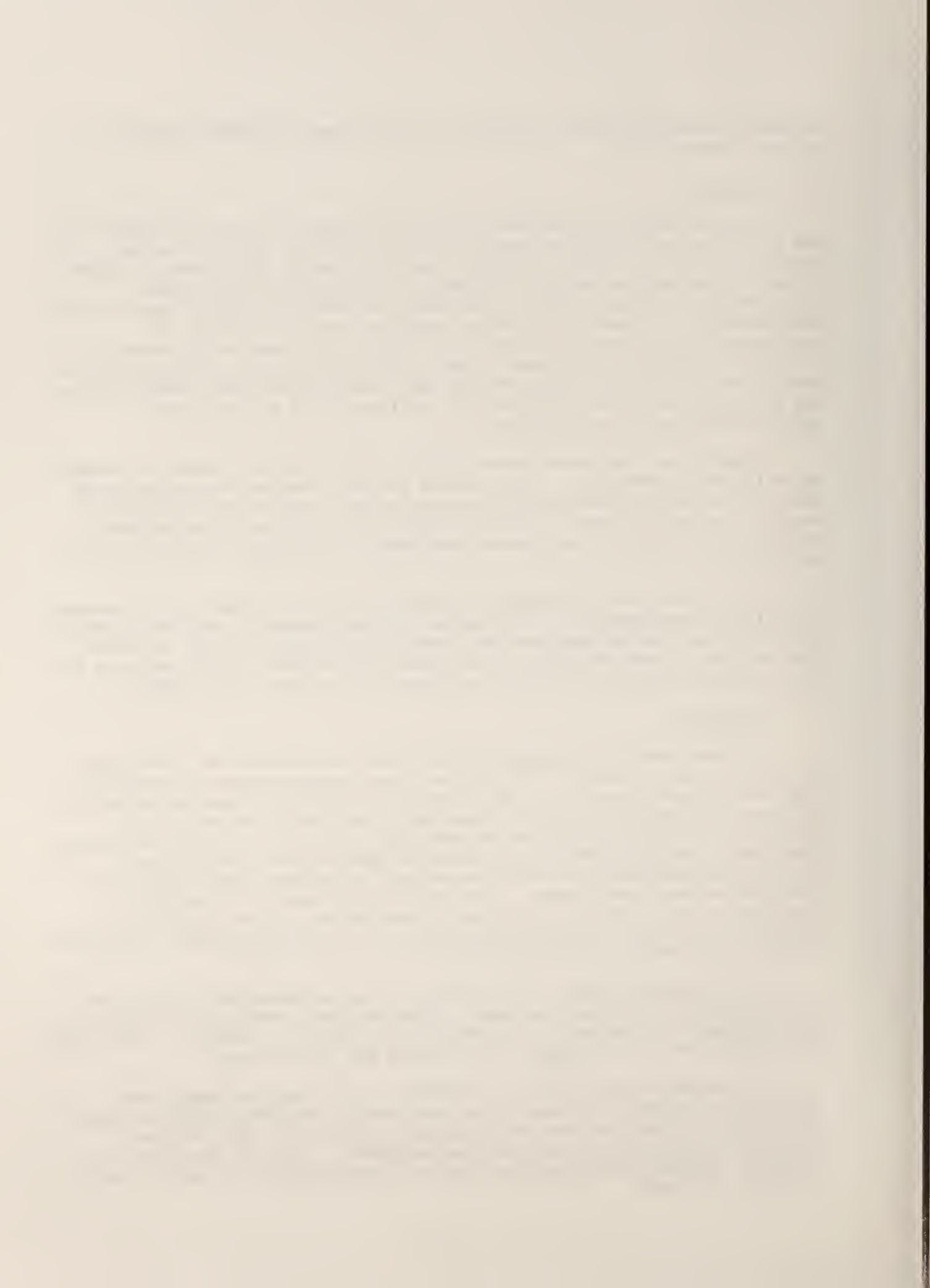
### Continence

The Texas Medicaid assessment form defines incontinence as "involuntary passage of urine or feces." In addition, the coding instructions state that "for the purpose of completion of this form, if a urinary retention catheter is in place, the individual is not considered incontinent." We added an additional category to this item by combining it with the "urinary tract care" item, which indicates whether a resident is catheterized. Most of the catheterized residents came from the category of residents experiencing both fecal and urinary incontinence. The resulting options for classifying residents on this item are as follows: 0) none noted/reported, 1) assistance required for control, 2) urinary incontinence, 3) fecal incontinence, 4) fecal and urinary incontinence, and 5) catheterized.

In the Medicaid sample, 41.0 percent of the residents were assessed as being continent of bladder and bowel. When the four incontinence categories are combined, 40.2 percent of the group is evaluated as displaying some degree of incontinence; 18.3 percent of this sample was catheterized.

The categories into which the residents in the Case-Mix sample were assessed are somewhat different from those used in the Texas Medicaid sample. The original classifications are indicated in Table 6-1. The continent category contained 37.3 percent of the residents. Slightly less than half (46%) of the sample displayed some type of incontinence; 16.7 percent had a catheter or ostomy.





Comparing the Medicaid sample with the Case-Mix sample, the distributions of assessments with respect to continence are similar, with the differences between the samples varying by category, and ranging from 2.1 to 5.8 percent. The proportion of residents assessed as continent is slightly higher in the Medicaid group, and the proportion in the incontinent category slightly lower.

### Diagnoses and clinical conditions

#### Coma

The comatose item was recoded, with the alert, listless, lethargic, and semi-coma categories combined to indicate "no coma"; 99.3 percent of the sample fell into this group. The remaining 0.7 percent of the sample was comatose. In the Case-Mix sample, 0.4 percent were assessed as in coma.

#### Orientation

The orientation item, as originally coded, indicates that the majority of Medicaid residents fell in the intermediate categories (needs reminding, moderate impairment, and severe impairment), with few residents in the extreme categories (good mental clarity and incoherence). When this item was dichotomized (with good mental clarity combined with needs reminding to form the "not confused" group, and moderate impairment, severe impairment and incoherence combined to form the "confused" group), 35.9 percent of the sample was not confused, and 64.1 percent of the sample was confused.

The orientation variable in the Texas Case-Mix sample has three categories: confused, not confused, and unable to determine. Those residents whose mental status could be determined were divided somewhat evenly: 46.3 percent of the sample was confused, and 49.0 percent was not confused. The remaining 4.7 percent were in the unable to determine category.

The distribution of assessments of mental status were different in the two samples. In the Medicaid sample, 64.1 percent of the residents were assessed as confused; in the Case-Mix sample, 46.3 percent were confused. The unable to determine group in the Case-Mix sample contains 4.7 percent of the sample, which is not a large enough proportion to account for this difference. It is possible, again, that this difference is real - that there were more confused residents in the Medicaid sample. It is also possible that there were differences in the criteria used to determine "confusion", or differences resulting from variations in judgment between different assessors.

#### Diagnoses

The variables created from ICD-9 codes in the Medicaid data indicate that the condition was one of up to five conditions coded as present for residents in the sample. The extent to which these diagnosis codes are updated as residents recover from certain conditions and develop new ones is unclear. Hip fractures were among these diagnoses for 6.9 percent of the sample; stroke or plegia for 21.8 percent of the sample. A diagnosis of diabetes was present for 18.1 percent of the sample; congestive heart failure was experienced by 17.9 percent of Medicaid residents. No urinary tract infections were detected when the diagnosis codes were scanned.





Diagnoses recorded in the Case-Mix study are based on a primary diagnosis: the condition that requires the most staff time. Since these data are based on only one reported diagnosis, and the Medicaid sample's diagnosis items were based on up to five diagnoses, it was expected that the prevalence of conditions detected through the reporting of diagnoses would be lower in the Case-Mix sample than in the Medicaid sample, and also lower than the actual number of conditions experienced by the group of residents, who are likely to have a combination of afflictions. Hip fractures were the primary diagnosis for 2.3 percent of this sample. Diabetes was the primary diagnosis for 6.1 percent of these residents, and 3.9 percent had a primary diagnosis of congestive heart failure. Just less than one percent had a primary diagnosis of urinary tract infection. Information about the prevalence of stroke or plegia is not available for this sample.

Due to the irregularity with which the Texas Medicaid assessments are updated, it is reasonable to expect that the conditions recorded were at one time experienced by the resident, but that it is possible that the resident has recovered. The Case-Mix project's sample, as a one-time cross-sectional assessment, is likely to be a more accurate picture of the residents' current status. Unfortunately, because the Case-Mix data are based on only a single diagnosis, and the Medicaid data based on up to five, it is not possible to directly compare the two groups of results.

#### Results of the Clinical Conditions and Service-related Outcomes

This next section describes the prevalence and 6-month changes in the clinical and service-related outcomes used in this study: contractures, decubitus ulcers, bladder/bowel training and restraints. The methods used for these analyses are presented in Chapter 3. Prevalence rates in the Medicaid sample are compared to those found by the Case-Mix project. Outcome results for the Texas Medicaid sample are presented, highlighting the significant association between each outcome and potential case-mix adjuster.

##### Contractures/paralysis

A single item on the Texas Medicaid assessment instrument is used to collect information about both contractures and paralysis. Contractures are defined as "permanent shortening or tightening of a muscle; fixed high resistance to the passive stretch of a muscle." Paralysis is defined as "loss of movement of the extremity(s) and/or loss of all sensation and reflexes. Contractures may or may not be present." It is not possible to distinguish between those residents coded positively on this item due to the presence of contractures only, to the presence of paralysis only, or to the presence of both.

##### Prevalence of contractures/paralysis

Contractures and/or paralysis were present in 20.4 percent of Medicaid residents in the sample (See Table 6-1). The Texas Nursing Home Case-Mix Project's cross-sectional data indicate a prevalence of contractures of 12.3 percent. Most Medicaid residents with contractures/paralysis were affected in more than one limb.

The prevalence of contractures was significantly higher among Medicaid residents with the following characteristics or conditions than among those





without these conditions: stroke or plegia (46.0%); age under 65 years (40.2%); and comatose (78.1%) (See Table 6-2). The trend in variation of prevalence by ADL level was also significant, with the independent group less likely to develop these conditions.

#### Recovery from contractures/paralysis

Of those Medicaid residents who had contractures and/or paralysis at the first assessment, 3.1 percent had none at the time of their second assessment. The rest (96.9%) of those with contractures and/or paralysis at Time 1 who remained in the facility were still assessed as having these conditions six months later. Perhaps because of the low rate of recovery, none of the characteristics examined were significantly associated with recovery from these conditions.

#### Incidence of contractures/paralysis

The overall incidence of contractures/paralysis over the six month period was 4.9 percent. This rate represents only the development of contractures and/or paralysis among those residents who had none at the time of their first assessment, and not the incidence of additional impairments among those residents who had either or both conditions at their first assessment. This incidence rate was significantly higher among those residents with stroke or plegia (14.6%), and lower among those residents who were ADL independent (in transferring and eating) (1.3%).

#### Summary: Contractures/paralysis

The prevalence of contractures and/or paralysis in this sample was 20.4 percent; the prevalence of contractures in the Texas Nursing Home Case-Mix Project's sample was 12.3 percent. This suggests that the combined item is identifying a larger proportion of residents, but that this proportion is not unreasonable, relative to the measure of contractures alone. The discharge rate for those Medicaid residents who had contractures and/or paralysis was slightly lower than overall. The prevalence and incidence of these conditions were higher among those residents with stroke or plegia, and lower among those who were ADL independent. The rate of recovery from these conditions was low.

#### Decubitus ulcers

The assessment instrument used to collect the Medicaid data defines decubitus ulcers as "ischemic ulceration and necrosis of tissues overlying a bony prominence which has been subjected to prolonged pressure against an external object (e.g. bed, wheelchair, cast or splint)." Stage one sores, the least severe, are included in the coding of the presence of sores.

#### Prevalence of decubitus ulcers

The overall prevalence of decubitus ulcers was 9.9 percent in the Medicaid sample, compared to 11.8 percent in the Case-Mix sample. Ulcers at more than one site were recorded for 3.5 percent of the sample. It is not possible, based on the information contained in these assessments, to determine the distribution of stages of these sores.

Certain subgroups of Medicaid residents had a significantly elevated

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prevalence of decubitus ulcers (See Table 6-3). These are residents with stroke or plegia (13.8%) and those who were comatose (40.6%). The prevalence was significantly associated with a trend in the ADL; residents with greater independence were less likely to have sores.

#### Recovery from decubitus ulcers

Of those Medicaid residents who had sores at the time of their first assessments, 37.9 percent had no sores at the second assessment. This recovery rate represents only complete recoveries, and not improvements, such as the healing of sores to a less severe stage, or the healing of one of many sores. None of the resident characteristics tested for association with recovery from decubitus ulcers were significantly related to recovery.

#### Incidence of decubitus ulcers

The incidence of decubitus ulcers during the six month period among those residents who had none at the time of their first assessment was 3.0 percent. This incidence rate reflects only the development of initial sores among residents who had none; it does not include the development of additional sores by those who already had some. The three-level ADL variable indicated a significant trend in incidence of sores with level of dependency; the rate was significantly lower among those residents who were more independent in ADL.

#### Summary: Decubitus ulcers

The characteristic most consistently associated with decubitus ulcers was ADL: those who were in the independent category were significantly less likely to have sores at the time of the first assessment, and were less likely to develop sores if they had none at the first assessment. Residents with stroke or plegia or who were comatose were also more likely to have sores at their first assessment. None of the variables which were examined were significantly associated with recovery from decubitus ulcers.

#### Bowel and/or bladder training

The coding manual detailing instructions on the Texas Medicaid assessment form defines bowel and bladder training as "a planned documented program for a patient with fecal and/or urinary incontinence." The assessment instrument collects information on orders for these services, not the actual receipt of the services.

#### Prevalence of bowel and/or bladder training

The bowel and bladder training item on the Medicaid data collection form contains two categories for residents who did not receive either bowel or bladder training. The first, containing 74.0 percent of the sample, is for residents deemed not to need training because they were continent (See Table 6-1). The second category, containing residents for whom the service was neither ordered nor performed, contains 21.8 percent of the sample. This classification does not consider whether the resident was continent. Taken together, these groups indicate that 95.8 percent of the sample did not receive bladder or bowel training. Less than one percent of the sample received either just bowel training or just bladder training; 2.5 percent received both bowel and bladder training.





Bowel or bladder training or both were ordered for 4.2 percent of the Texas Medicaid residents. The Case-Mix data, which reflects the actual delivery of services, indicate that less than half as many (1.9%) of the residents received either or both of these services (See Table 6-1). This difference may be the result of orders having once been made for these services and the services either discontinued or not given, or the assessment not updated to reflect the discontinuation of the service.

The prevalence of these services in the Medicaid population varied significantly with the presence of three of the conditions which were examined (See Table 6-4). Those who had suffered hip fractures and those who were confused or disoriented had significantly higher prevalences (8.4% and 5.0%, respectively). The three-level ADL item indicated a significant trend in the prevalence of sores; those who were independent (independent in transferring and eating) had a lower prevalence (2.5%).

#### Discontinuation of bowel and/or bladder training

The rate of discontinuation of bladder and/or bowel training among those Medicaid residents who remained in the facility for the six month study period was 31.3 percent. Conversely, 68.7 percent of those residents who were receiving these services at the time of the first assessment were still receiving the service six months later. This rate did not differ significantly for any of the subgroups which were examined.

#### Incidence of bowel and/or bladder training

The incidence of these services among Medicaid residents who were not receiving them at the time of the first assessment was 0.4 percent. Due to this low overall incidence, the rate did not vary significantly for any of the subgroups which were examined.

#### Summary: Bowel and/or bladder training

The prevalence of these services in this sample (4.2%) was more than twice that found in the sample developed by the Texas Nursing Home Case-Mix Project (1.9%). The difference in these rates may be due to the fact that the assessment instruments used to collect these data ask different questions. The Medicaid instrument collects information about orders for service, while the Case-Mix instrument collects information about the actual receipt of services. In this instance, it is possible that orders for bowel and bladder training are issued more frequently than are the actual services. Medicaid residents who had had hip fractures and residents who were ADL independent were more likely to have bowel and/or bladder training ordered.

#### Restraints

The Texas Medicaid assessment instrument collects information on orders for physical, mechanical, and chemical restraints. The "restraints" item collects information about two different kinds of devices: protective and supportive devices, and restraints. Protective and supportive devices are defined as special chairs, braces, and similar items. Restraints are defined as devices or medications used for quieting or controlling disorderly or disruptive behavior. Protective and supportive devices were not considered to



1. The first part of the document discusses the importance of maintaining accurate records of all transactions and the role of the accounting department in ensuring the integrity of the financial data. It emphasizes the need for transparency and accountability in all financial reporting.

2. The second part of the document outlines the various methods used to collect and analyze financial data, including the use of spreadsheets, databases, and specialized accounting software. It also discusses the importance of regular audits and the role of external auditors in verifying the accuracy of the financial statements.

3. The third part of the document focuses on the preparation and presentation of financial statements, including the balance sheet, income statement, and cash flow statement. It provides detailed guidance on the format and content of these statements, as well as the required disclosures and footnotes.

4. The fourth part of the document discusses the role of the accounting department in providing financial information to management and other stakeholders. It emphasizes the importance of clear communication and the use of visual aids, such as charts and graphs, to present complex financial data in a more accessible and understandable format.

5. The fifth part of the document discusses the role of the accounting department in ensuring compliance with applicable laws and regulations, including the Sarbanes-Oxley Act and the Dodd-Frank Act. It provides guidance on the required internal controls and the role of the accounting department in monitoring and reporting on compliance.

6. The sixth part of the document discusses the role of the accounting department in providing financial information to the public, including the preparation and filing of annual reports and the disclosure of material information to investors and other stakeholders. It emphasizes the importance of transparency and the role of the accounting department in ensuring the accuracy and integrity of the financial information.

7. The seventh part of the document discusses the role of the accounting department in providing financial information to the government, including the preparation and filing of tax returns and the disclosure of financial information to regulatory agencies. It emphasizes the importance of accuracy and the role of the accounting department in ensuring compliance with applicable laws and regulations.

8. The eighth part of the document discusses the role of the accounting department in providing financial information to the media and other stakeholders, including the preparation and filing of press releases and the disclosure of financial information to the public. It emphasizes the importance of transparency and the role of the accounting department in ensuring the accuracy and integrity of the financial information.

9. The ninth part of the document discusses the role of the accounting department in providing financial information to the public, including the preparation and filing of annual reports and the disclosure of financial information to investors and other stakeholders. It emphasizes the importance of transparency and the role of the accounting department in ensuring the accuracy and integrity of the financial information.

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be restraints for the purposes of this analysis. Since the information collected relates to orders for restraints, information about the actual use of restraints can only be inferred.

#### Prevalence of orders for restraints

The restraints item indicates that 13.1 percent of the residents in the Medicaid sample had orders for some type of restraints (See Table 6-5). The majority of these orders were for continuous restraints (11.1%); the remaining 2 percent were orders for restraints during waking hours. Information on the use of restraints is not available from the Case-Mix sample.

The prevalence was significantly higher among those residents who were confused or disoriented (18.7%) than among those who were not confused (13.2%) (See Table 6-1). The three-level ADL scale indicated a significant trend in the variation of orders for restraints with change in level of dysfunction; those who were independent had the lowest prevalence of orders for restraints.

#### Discontinuation of restraints

The overall rate of discontinuation of orders for restraints among those who had restraints ordered at the time of the first assessment was 6.2 percent. None of the conditions or characteristics examined indicated a significant difference in the rate of discontinuation of orders for restraints.

#### Incidence of restraints

The overall incidence of orders for restraints over the six month period among those for whom restraints were not ordered at the first assessment was 4.1 percent. As was the case with the prevalence at the time of the first assessments, the three-level ADL scale indicated a significant difference in the incidence of orders for restraints with progressive levels of dysfunction. The incidence among those residents assessed as independent was 1.1 percent, while, among those who were dependent, the incidence was 9.9 percent.

#### Summary: Restraints

The prevalence at the first assessment and the incidence over the six month study period of orders for restraints were higher among those who were classified as dependent on the three-level ADL scale (dependent in transferring and feeding). In addition, residents who were confused or disoriented had a higher prevalence and incidence than those whose mental status was clear. The rate of discontinuation of orders for restraint was low; perhaps because of this low rate, none of the characteristics examined indicated a significant difference in the rate of discontinuation.



Table 6-1

Texas-Medicaid and Texas Nursing Home Case-Mix samples Time 1 values for  
dependent and independent variables

<u>Texas Medicaid Sample</u> 1985		<u>Texas Nursing Home</u> <u>Case-Mix Sample</u> 1986	
n=4,512		n=1,997	
	%		%
Current primary payor		Current primary payor	
Medicaid	100.0	Medicaid	53.5
		Medicaid and Medicare	11.6
		Private Pay	25.0
		Other	9.9
Age category		Age category	
Under 65	10.7	Under 70	3.9
65-89	68.8	70-89	72.5
90+	20.5	90+	23.7
Male	27.0	Male	24.0
Feeding		Feeding	
Independent	34.8	Independent	48.6
Supervised	13.5	Supervised	17.8
Min assistance	11.3	Constant Superv.	8.1
Mod assistance	17.3	Hand fed	20.4
Max assistance	16.5	Tube fed	5.1
Tube fed	6.6		
Transferring		Transferring	
Independent	23.4	Independent	28.5
Supervised	6.1	Supervised	10.6
Min assistance	19.3	One assistant	24.1
Mod assistance	11.8	Two assistants	30.1
Max assistance	39.4	Bedfast or not transferred	6.6
3-Level ADL		3-Level ADL	N/A
Indep in feeding, transfer	41.3		
Intermediate	25.6		
Dep in feeding, transfer	33.1		

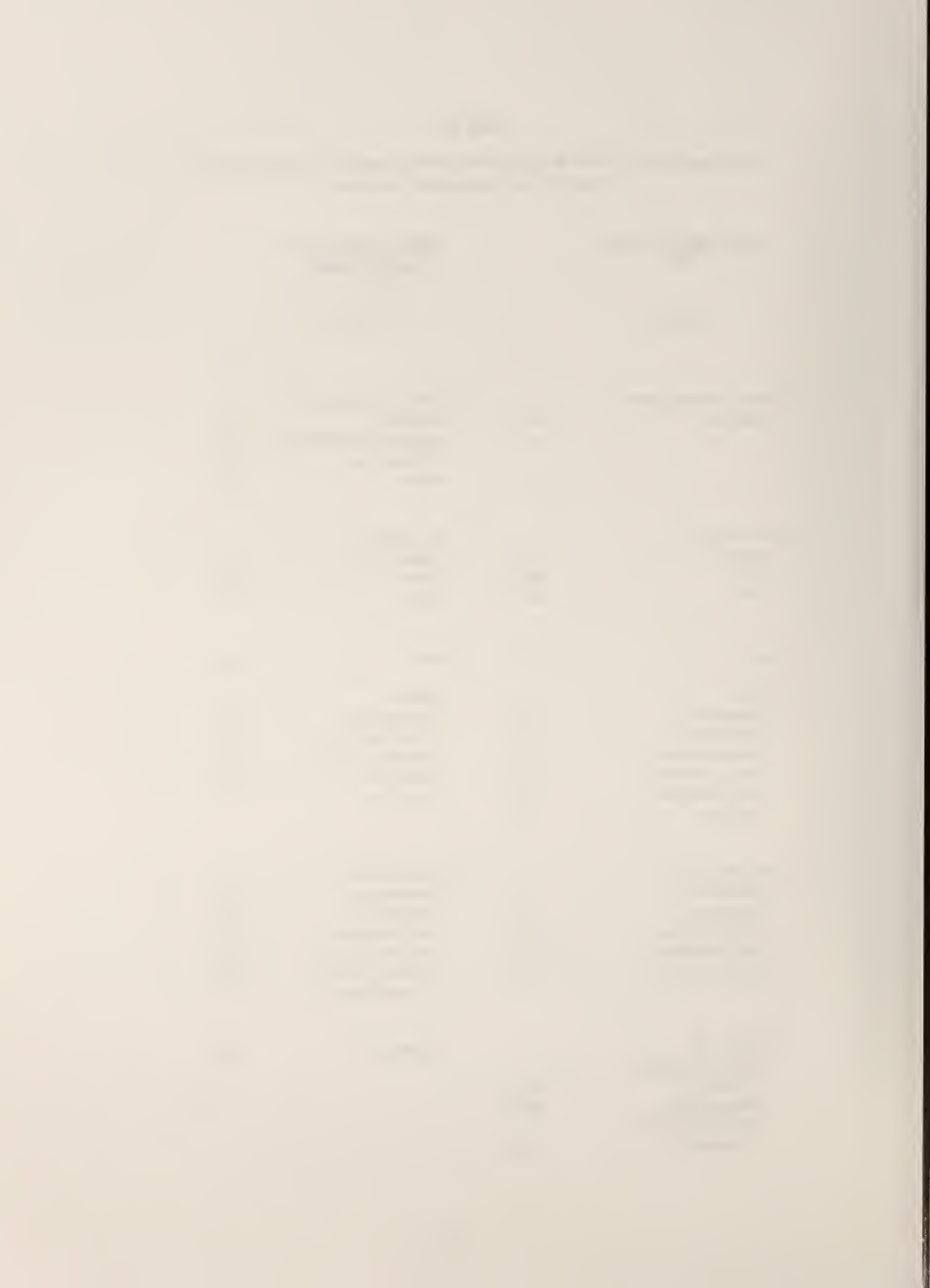




Table 6-1 (cont'd)

<u>Texas Medicaid Sample</u> 1985		<u>Texas Nursing Home</u> <u>Case-Mix Sample</u> 1986	
	%		%
Mobility		Mobility	
Independent	20.6	Walks independently	16.1
Supervised	6.9	Wheels independently	12.5
Min assistance	16.0	Supervised	16.4
Mod assistance	21.0	One assistant	10.7
Max assistance	35.5	Two assistants	4.8
		Wheeled or bedfast	39.5
Toileting		Toileting	
Independent	22.4	Independent	28.0
Supervised	5.4	Supervised	12.4
Min assistance	17.0	Constant assist	12.5
Mod assistance	10.4	Total assistance	19.7
Max assistance	44.7	Not toileted	27.4
Incontinence		<sup>1</sup> Incontinence	
None	41.0	None	37.3
Assist. required	8.9	Occas incont	9.7
Urinary incont.	6.0	Freq. incont	36.3
Fecal incont.	1.6	Catheter or ostomy	16.7
Fecal + urinary	23.7		
Catheterized	18.8		
Coma	0.7	Coma	0.4
Orientation		Orientation	
Confused	64.1	Confused	46.3
Not confused	35.9	Not confused	49.0
		Unable to determine	4.7
Hip fracture	6.9	Hip fracture	2.3
Stroke/plegia	21.8	Stroke/plegia	N/A
Diabetes	18.1	Diabetes	6.1
Congestive heart failure	17.9	Congestive heart failure	3.9
Urinary tract infection	0.0	Urinary tract infection	0.9

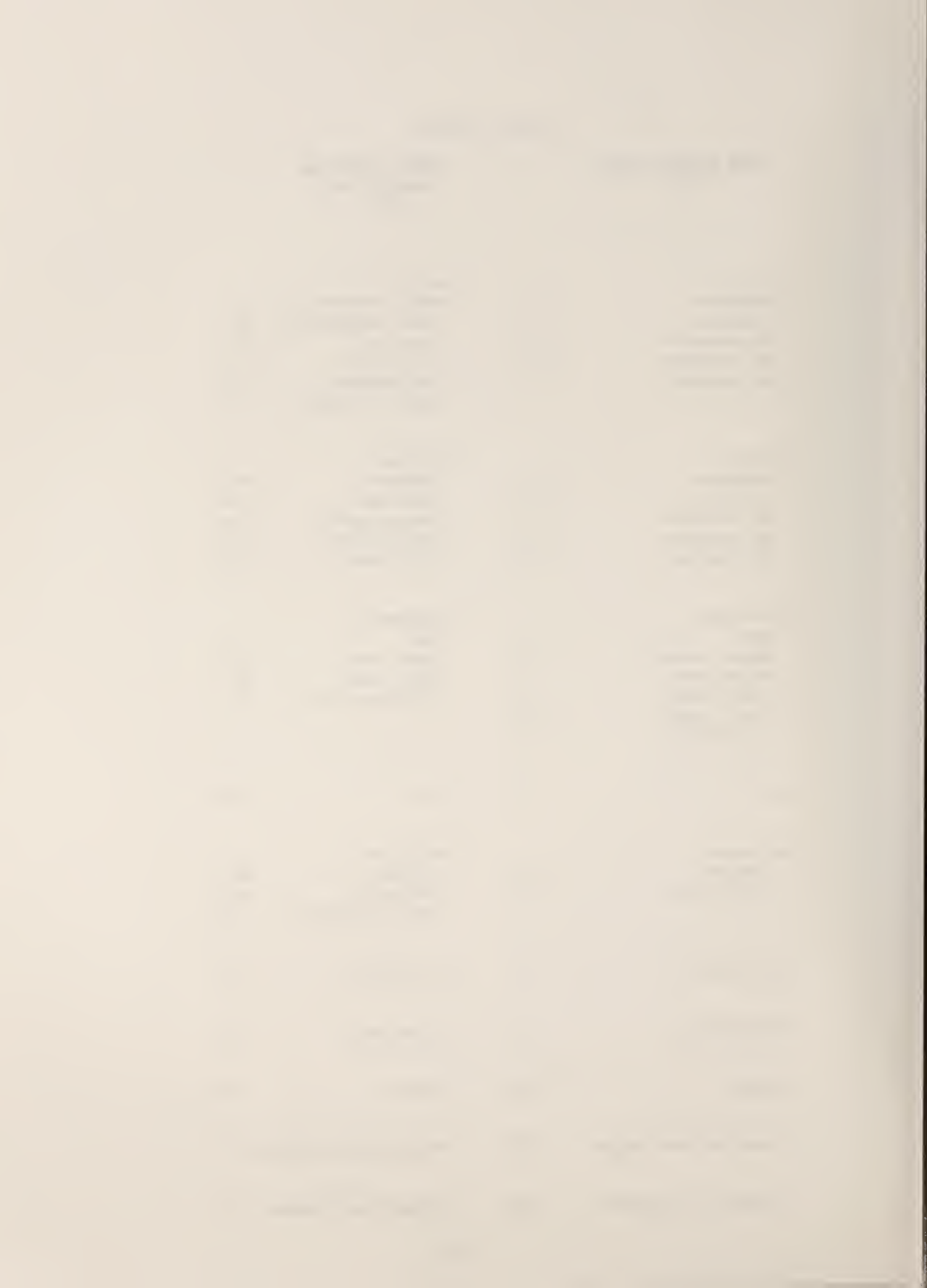


Table 6-1 (cont'd)

<u>Texas Medicaid Sample</u> 1985	%	<u>Texas Nursing Home</u> <u>Case-Mix Sample</u> 1986	%
Contractures/paralysis		Contractures	
None	79.6	No (not in 4 weeks)	87.7
1 limb affected	3.7	Yes	12.3
2 limbs affected	10.7		
3 limbs affected	1.0		
4 limbs affected	5.0		
Decubitus		Decubitus	
None	90.1	None	88.2
1 site, no dressings	3.8	Stage 1	2.4
1 site, w/dressings	2.6	Stage 2	4.8
2+sites, no dressings	1.3	Stage 3	3.2
2+sites, w/ dressings	2.2	Stage 4	1.4
Bowel/bladder training		Bowel/Bladder training	
No need; continent	74.0	No	98.1
Not ordered nor performed	21.8	Yes	1.9
Bowel training	0.8		
Bladder training	0.9		
Bowel, bladder training	2.5		
Restraints		Restraints	
None needed, ordered	45.4		
Protect, support, PRN	31.6		
Protect, support, daily	9.9	N/A	
Restraints, waking hours	2.0		
Restraints, continuous	11.1		



Table 6-2

Prevalence, maintenance, recovery, and incidence of contractures or paralysis over 6-month period for Medicaid residents in a sample of nursing homes in Texas, 1984-1986.

<u>Independent Variable</u>	<u>Prevalence</u>	<u>Maintenance</u>	<u>Recovery</u>	<u>Incidence</u>
Overall	20.4 (922/4511)	96.9 (432/446)	3.1 (14/446)	4.9 (101/2080)
1				
Hip Fracture				
Yes	18.6 (58/311)	96.4 (27/28)	3.6 (1/28)	7.0 (11/157)
No	20.6 (64/4200)	96.9 (405/418)	3.1 (13/418)	4.7 (90/1923)
1				
Stroke/Plegia				
Yes	46.0 (453/985)*	96.2 (204/212)	3.8 (8/212)	14.6 (44/301)*
No	13.3 (469/3526)	97.4 (228/234)	2.6 (6/234)	3.2 (57/1779)
ADL (Transfer & Eating)				
Independent	6.2 (116/1865)*	94.4 (67/71)	5.6 (4/71)	1.3 (15/1127)*
Intermediate	19.1 (220/1154)	97.5 (117/120)	2.5 (3/120)	6.2 (32/520)
Dependent	39.3 (586/1492)	97.3 (248/255)	2.7 (7/255)	12.5 (54/433)
Age				
< 65	40.2 (194/482)*	99.0 (101/102)	1.0 (1/102)	8.5 (14/163)
65-89	18.6 (577/3105)	96.1 (273/284)	3.9 (11/284)	4.7 (69/1456)
90 +	16.3 (151/924)	96.7 (58/60)	3.3 (2/60)	3.9 (18/461)
Comatose				
Yes	78.1 (25/32)*	100.0 (3/3)	0.0 (0/3)	0.0 (0/1)
No	20.0 (897/4479)	96.8 (429/443)	3.2 (14/443)	4.9 (101/2079)

\*

p < .001

1

Based on occurrence of ICD-9 codes for condition among any of five listed diagnoses.

2

Independent is defined as independent (independent, supervised, or minimum assistance) in transfer and eating; intermediate is defined as dependent (requires moderate or maximum assistance or is tube-fed) in either transfer or eating; dependent is defined as dependent in both transfer and eating.



Table 1

Summary of Data				
Year	Group	Variable 1	Variable 2	Variable 3
1990	A	10.5	2.1	0.8
1991	A	11.2	2.3	0.9
1992	A	12.0	2.5	1.0
1993	A	12.8	2.7	1.1
1994	A	13.5	2.9	1.2
1995	A	14.2	3.1	1.3
1996	A	15.0	3.3	1.4
1997	A	15.8	3.5	1.5
1998	A	16.5	3.7	1.6
1999	A	17.2	3.9	1.7
2000	A	18.0	4.1	1.8
2001	A	18.8	4.3	1.9
2002	A	19.5	4.5	2.0
2003	A	20.2	4.7	2.1
2004	A	21.0	4.9	2.2
2005	A	21.8	5.1	2.3
2006	A	22.5	5.3	2.4
2007	A	23.2	5.5	2.5
2008	A	24.0	5.7	2.6
2009	A	24.8	5.9	2.7
2010	A	25.5	6.1	2.8
2011	A	26.2	6.3	2.9
2012	A	27.0	6.5	3.0
2013	A	27.8	6.7	3.1
2014	A	28.5	6.9	3.2
2015	A	29.2	7.1	3.3
2016	A	30.0	7.3	3.4
2017	A	30.8	7.5	3.5
2018	A	31.5	7.7	3.6
2019	A	32.2	7.9	3.7
2020	A	33.0	8.1	3.8
2021	A	33.8	8.3	3.9
2022	A	34.5	8.5	4.0
2023	A	35.2	8.7	4.1
2024	A	36.0	8.9	4.2
2025	A	36.8	9.1	4.3
2026	A	37.5	9.3	4.4
2027	A	38.2	9.5	4.5
2028	A	39.0	9.7	4.6
2029	A	39.8	9.9	4.7
2030	A	40.5	10.1	4.8
2031	A	41.2	10.3	4.9
2032	A	42.0	10.5	5.0
2033	A	42.8	10.7	5.1
2034	A	43.5	10.9	5.2
2035	A	44.2	11.1	5.3
2036	A	45.0	11.3	5.4
2037	A	45.8	11.5	5.5
2038	A	46.5	11.7	5.6
2039	A	47.2	11.9	5.7
2040	A	48.0	12.1	5.8
2041	A	48.8	12.3	5.9
2042	A	49.5	12.5	6.0
2043	A	50.2	12.7	6.1
2044	A	51.0	12.9	6.2
2045	A	51.8	13.1	6.3
2046	A	52.5	13.3	6.4
2047	A	53.2	13.5	6.5
2048	A	54.0	13.7	6.6
2049	A	54.8	13.9	6.7
2050	A	55.5	14.1	6.8
2051	A	56.2	14.3	6.9
2052	A	57.0	14.5	7.0
2053	A	57.8	14.7	7.1
2054	A	58.5	14.9	7.2
2055	A	59.2	15.1	7.3
2056	A	60.0	15.3	7.4
2057	A	60.8	15.5	7.5
2058	A	61.5	15.7	7.6
2059	A	62.2	15.9	7.7
2060	A	63.0	16.1	7.8
2061	A	63.8	16.3	7.9
2062	A	64.5	16.5	8.0
2063	A	65.2	16.7	8.1
2064	A	66.0	16.9	8.2
2065	A	66.8	17.1	8.3
2066	A	67.5	17.3	8.4
2067	A	68.2	17.5	8.5
2068	A	69.0	17.7	8.6
2069	A	69.8	17.9	8.7
2070	A	70.5	18.1	8.8
2071	A	71.2	18.3	8.9
2072	A	72.0	18.5	9.0
2073	A	72.8	18.7	9.1
2074	A	73.5	18.9	9.2
2075	A	74.2	19.1	9.3
2076	A	75.0	19.3	9.4
2077	A	75.8	19.5	9.5
2078	A	76.5	19.7	9.6
2079	A	77.2	19.9	9.7
2080	A	78.0	20.1	9.8
2081	A	78.8	20.3	9.9
2082	A	79.5	20.5	10.0
2083	A	80.2	20.7	10.1
2084	A	81.0	20.9	10.2
2085	A	81.8	21.1	10.3
2086	A	82.5	21.3	10.4
2087	A	83.2	21.5	10.5
2088	A	84.0	21.7	10.6
2089	A	84.8	21.9	10.7
2090	A	85.5	22.1	10.8
2091	A	86.2	22.3	10.9
2092	A	87.0	22.5	11.0
2093	A	87.8	22.7	11.1
2094	A	88.5	22.9	11.2
2095	A	89.2	23.1	11.3
2096	A	90.0	23.3	11.4
2097	A	90.8	23.5	11.5
2098	A	91.5	23.7	11.6
2099	A	92.2	23.9	11.7
2100	A	93.0	24.1	11.8
2101	A	93.8	24.3	11.9
2102	A	94.5	24.5	12.0
2103	A	95.2	24.7	12.1
2104	A	96.0	24.9	12.2
2105	A	96.8	25.1	12.3
2106	A	97.5	25.3	12.4
2107	A	98.2	25.5	12.5
2108	A	99.0	25.7	12.6
2109	A	99.8	25.9	12.7
2110	A	100.5	26.1	12.8
2111	A	101.2	26.3	12.9
2112	A	102.0	26.5	13.0
2113	A	102.8	26.7	13.1
2114	A	103.5	26.9	13.2
2115	A	104.2	27.1	13.3
2116	A	105.0	27.3	13.4
2117	A	105.8	27.5	13.5
2118	A	106.5	27.7	13.6
2119	A	107.2	27.9	13.7
2120	A	108.0	28.1	13.8
2121	A	108.8	28.3	13.9
2122	A	109.5	28.5	14.0
2123	A	110.2	28.7	14.1
2124	A	111.0	28.9	14.2
2125	A	111.8	29.1	14.3
2126	A	112.5	29.3	14.4
2127	A	113.2	29.5	14.5
2128	A	114.0	29.7	14.6
2129	A	114.8	29.9	14.7
2130	A	115.5	30.1	14.8
2131	A	116.2	30.3	14.9
2132	A	117.0	30.5	15.0
2133	A	117.8	30.7	15.1
2134	A	118.5	30.9	15.2
2135	A	119.2	31.1	15.3
2136	A	120.0	31.3	15.4
2137	A	120.8	31.5	15.5
2138	A	121.5	31.7	15.6
2139	A	122.2	31.9	15.7
2140	A	123.0	32.1	15.8
2141	A	123.8	32.3	15.9
2142	A	124.5	32.5	16.0
2143	A	125.2	32.7	16.1
2144	A	126.0	32.9	16.2
2145	A	126.8	33.1	16.3
2146	A	127.5	33.3	16.4
2147	A	128.2	33.5	16.5
2148	A	129.0	33.7	16.6
2149	A	129.8	33.9	16.7
2150	A	130.5	34.1	16.8
2151	A	131.2	34.3	16.9
2152	A	132.0	34.5	17.0
2153	A	132.8	34.7	17.1
2154	A	133.5	34.9	17.2
2155	A	134.2	35.1	17.3
2156	A	135.0	35.3	17.4
2157	A	135.8	35.5	17.5
2158	A	136.5	35.7	17.6
2159	A	137.2	35.9	17.7
2160	A	138.0	36.1	17.8
2161	A	138.8	36.3	17.9
2162	A	139.5	36.5	18.0
2163	A	140.2	36.7	18.1
2164	A	141.0	36.9	18.2
2165	A	141.8	37.1	18.3
2166	A	142.5	37.3	18.4
2167	A	143.2	37.5	18.5
2168	A	144.0	37.7	18.6
2169	A	144.8	37.9	18.7
2170	A	145.5	38.1	18.8
2171	A	146.2	38.3	18.9
2172	A	147.0	38.5	19.0
2173	A	147.8	38.7	19.1
2174	A	148.5	38.9	19.2
2175	A	149.2	39.1	19.3
2176	A	150.0	39.3	19.4
2177	A	150.8	39.5	19.5
2178	A	151.5	39.7	19.6
2179	A	152.2	39.9	19.7
2180	A	153.0	40.1	19.8
2181	A	153.8	40.3	19.9
2182	A	154.5	40.5	20.0
2183	A	155.2	40.7	20.1
2184	A	156.0	40.9	20.2
2185	A	156.8	41.1	20.3
2186	A	157.5	41.3	20.4
2187	A	158.2	41.5	20.5
2188	A	159.0	41.7	20.6
2189	A	159.8	41.9	20.7
2190	A	160.5	42.1	20.8
2191	A	161.2	42.3	20.9
2192	A	162.0	42.5	21.0
2193	A	162.8	42.7	21.1
2194	A	163.5	42.9	21.2
2195	A	164.2	43.1	21.3
2196	A	165.0	43.3	21.4
2197	A	165.8	43.5	21.5
2198	A	166.5	43.7	21.6
2199	A	167.2	43.9	21.7
2200	A	168.0	44.1	21.8
2201	A	168.8	44.3	21.9
2202	A	169.5	44.5	22.0
2203	A	170.2	44.7	22.1
2204	A	171.0	44.9	22.2
2205	A	171.8	45.1	22.3
2206	A	172.5	45.3	22.4
2207	A	173.2	45.5	22.5
2208	A	174.0	45.7	22.6
2209	A	174.8	45.9	22.7
2210	A	175.5	46.1	22.8
2211	A	176.2	46.3	22.9
2212	A	177.0	46.5	23.0
2213	A	177.8	46.7	23.1
2214	A	178.5	46.9	23.2
2215	A	179.2	47.1	23.3
2216	A	180.0	47.3	23.4
2217	A	180.8	47.5	23.5
2218	A	181.5	47.7	23.6
2219	A	182.2	47.9	23.7
2220	A	183.0	48.1	23.8
2221	A	183.8	48.3	23.9
2222	A	184.5	48.5	24.0
2223	A	185.2	48.7	24.1
2224	A	186.0	48.9	24.2
2225	A	186.8	49.1	24.3
2226	A	187.5	49.3	24.4
2227	A	188.2	49.5	24.5
2228	A	189.0	49.7	24.6
2229	A	189.8	49.9	24.7
2230	A	190.5	50.1	24.8
2231	A	191.2	50.3	24.9
2232	A	192.0	50.5	25.0
2233	A	192.8	50.7	25.1
2234	A	193.5	50.9	25.2
2235	A	194.2	51.1	25.3
2236	A	195.0	51.3	25.4
2237	A	195.8	51.5	25.5
2238	A	196.5	51.7	25.6
2239	A	197.2	51.9	25.7
2240	A	198.0	52.1	25.8
2241	A	198.8	52.3	25.9
2242	A	199.5	52.5	26.0
2243	A	200.2	52.7	26.1
2244	A	201.0	52.9	26.2
2245	A	201.8	53.1	26.3
2246	A	202.5	53.3	26.4
2247	A	203.2	53.5	26.5
2248	A	204.0	53.7	26.6
2249	A	204.8	53.9	26.7
2250	A	205.5	54.1	26.8
2251	A	206.2	54.3	26.9
2252	A	207.0	54.5	27.0
2253	A	207.8	54.7	27.1
2254	A	208.5	54.9	27.2
2255	A	209.2	55.1	27.3
2256	A	210.0	55.3	27.4
2257	A	210.8	55.5	27.5
2258	A	211.5	55.7	27.6
2259	A	212.2	55.9	27.7
2260	A	213.0	56.1	27.8
2261				

Table 6-3

Prevalence, maintenance, recovery, and incidence of decubitus ulcers over 6-month period for Medicaid residents in a sample of nursing homes in Texas, 1984-1986.

<u>Independent Variable</u>	<u>Prevalence</u>	<u>Maintenance</u>	<u>Recovery</u>	<u>Incidence</u>
Overall	9.9 (446/4511)	62.1 (87/140)	37.9 (53/140)	3.0 (71/2386)
1				
Hip Fracture				
Yes	7.1 (22/311)	71.4 (5/7)	28.6 (2/7)	5.1 (9/177)
No	10.1 (424/4200)	61.4 (81/132)	38.6 (51/132)	2.8 (62/2209)
1				
Stroke/Plegia				
Yes	13.8 (136/985)*	69.4 (25/36)	30.6 (11/36)	3.4 (16/477)
No	8.8 (310/3526)	59.6 (62/104)	40.4 (42/104)	2.9 (55/1909)
1				
Congestive Heart Failure				
Yes	9.8 (79/806)	72.7 (16/22)	27.3 (6/22)	5.2 (20/385)
No	9.9 (367/3705)	60.2 (71/118)	39.8 (47/118)	2.5 (51/2001)
2				
ADL (Transfer & Eating)				
Independent	1.9 (36/1865)*	52.9 (9/17)	47.1 (8/17)	1.2 (14/1181)*
Intermediate	8.8 (102/1154)	60.0 (24/40)	40.0 (16/40)	3.7 (22/600)
Dependent	20.6 (308/1492)	65.1 (54/83)	34.9 (29/83)	5.8 (35/605)
Age				
< 65	13.1 (63/482)	61.1 (11/18)	38.9 (7/18)	4.0 (10/247)
65-89	9.4 (291/3105)	62.5 (55/88)	37.5 (33/88)	2.2 (37/1652)
90 +	10.0 (92/924)	61.8 (21/34)	38.2 (13/34)	4.9 (24/487)
1				
Diabetes				
Yes	11.2 (91/816)	42.9 (9/21)	57.1 (12/21)	4.0 (16/401)
No	9.6 (355/3695)	65.5 (78/119)	34.5 (41/119)	2.8 (55/1985)
Comatose				
Yes	40.6 (13/32)*	50.0 (1/2)	50.0 (1/2)	0.0 (0/2)
No	9.7 (433/4479)	62.3 (86/138)	37.7 (52/138)	3.0 (71/2384)

\*

p < .001

1

Based on occurrence of ICD-9 codes for condition among any of five listed diagnoses.

2

Independent is defined as independent (independent, supervised, or minimum assistance) in transfer and eating; intermediate is defined as dependent (requires moderate or maximum assistance or is tube-fed) in either transfer or eating; dependent is defined as dependent in both transfer and eating.

TABLE

No. of persons in each family					Total
1	2	3	4	5	
10	15	20	25	30	90
11	16	21	26	31	95
12	17	22	27	32	100
13	18	23	28	33	105
14	19	24	29	34	110
15	20	25	30	35	115
16	21	26	31	36	120
17	22	27	32	37	125
18	23	28	33	38	130
19	24	29	34	39	135
20	25	30	35	40	140
21	26	31	36	41	145
22	27	32	37	42	150
23	28	33	38	43	155
24	29	34	39	44	160
25	30	35	40	45	165
26	31	36	41	46	170
27	32	37	42	47	175
28	33	38	43	48	180
29	34	39	44	49	185
30	35	40	45	50	190
31	36	41	46	51	195
32	37	42	47	52	200
33	38	43	48	53	205
34	39	44	49	54	210
35	40	45	50	55	215
36	41	46	51	56	220
37	42	47	52	57	225
38	43	48	53	58	230
39	44	49	54	59	235
40	45	50	55	60	240
41	46	51	56	61	245
42	47	52	57	62	250
43	48	53	58	63	255
44	49	54	59	64	260
45	50	55	60	65	265
46	51	56	61	66	270
47	52	57	62	67	275
48	53	58	63	68	280
49	54	59	64	69	285
50	55	60	65	70	290
51	56	61	66	71	295
52	57	62	67	72	300
53	58	63	68	73	305
54	59	64	69	74	310
55	60	65	70	75	315
56	61	66	71	76	320
57	62	67	72	77	325
58	63	68	73	78	330
59	64	69	74	79	335
60	65	70	75	80	340
61	66	71	76	81	345
62	67	72	77	82	350
63	68	73	78	83	355
64	69	74	79	84	360
65	70	75	80	85	365
66	71	76	81	86	370
67	72	77	82	87	375
68	73	78	83	88	380
69	74	79	84	89	385
70	75	80	85	90	390
71	76	81	86	91	395
72	77	82	87	92	400
73	78	83	88	93	405
74	79	84	89	94	410
75	80	85	90	95	415
76	81	86	91	96	420
77	82	87	92	97	425
78	83	88	93	98	430
79	84	89	94	99	435
80	85	90	95	100	440
81	86	91	96	101	445
82	87	92	97	102	450
83	88	93	98	103	455
84	89	94	99	104	460
85	90	95	100	105	465
86	91	96	101	106	470
87	92	97	102	107	475
88	93	98	103	108	480
89	94	99	104	109	485
90	95	100	105	110	490
91	96	101	106	111	495
92	97	102	107	112	500
93	98	103	108	113	505
94	99	104	109	114	510
95	100	105	110	115	515
96	101	106	111	116	520
97	102	107	112	117	525
98	103	108	113	118	530
99	104	109	114	119	535
100	105	110	115	120	540

Table 6-4

Prevalence, maintenance, discontinuation, and incidence of bladder/bowel training over 6-month period for Medicaid residents in a sample of nursing homes in Texas, 1984-1986.

<u>Independent Variable</u>	<u>Prevalence</u>	<u>Maintenance</u>	<u>Discontinued</u>	<u>Incidence</u>
Overall	4.2 (189/4510)	68.7 (68/99)	31.3 (31/99)	0.4 (10/2427)
1				
Hip Fracture				
Yes	8.4 (26/311)*	62.5 (10/16)	37.5 (6/16)	1.8 (3/169)
No	3.9 (163/4199)	69.9 (58/83)	30.1 (25/83)	0.3 (7/2258)
1				
Stroke/Plegia				
Yes	5.2 (51/985)	61.5 (16/26)	38.5 (10/26)	0.4 (2/487)
No	3.9 (138/3525)	71.2 (52/73)	28.8 (21/73)	0.4 (8/1940)
2				
ADL (Transfer & Eating)				
Independent	2.5 (24/1198)*	75.0 (18/24)	25.0 (6/24)	0.3 (4/1174)
Intermediate	6.0 (69/1154)	59.4 (19/32)	40.6 (13/32)	0.8 (5/608)
Dependent	4.9 (73/1491)	72.1 (31/43)	27.9 (12/43)	0.2 (1/645)
Age				
< 65	5.2 (25/482)*	60.0 (6/10)	40.0 (4/10)	0.0 (0/255)
65-89	4.1 (128/3105)	67.2 (45/67)	32.8 (22/67)	0.5 (9/1673)
90 +	3.9 (36/923)	77.3 (17/22)	22.7 (5/22)	0.2 (1/499)
Confused/Disoriented				
Yes	5.0 (145/2891)*	69.5 (57/82)	30.5 (25/82)	0.4 (7/1574)
No	2.7 (44/1619)	64.7 (11/17)	35.3 (6/17)	0.4 (3/853)

\*

p < .001

1

Based on occurrence of ICD-9 codes for condition among any of five listed diagnoses.

2

Independent is defined as independent (independent, supervised, or minimum assistance) in transfer and eating; intermediate is defined as dependent (requires moderate or maximum assistance or is tube-fed) in either transfer or eating; dependent is defined as dependent in both transfer and eating.

the following is a summary of the results of the experiments conducted on the effect of the concentration of the solution on the rate of reaction.

Concentration of Solution (M)	Rate of Reaction (mol/l.s)	Time taken for completion (s)	Observations
0.1	0.002	100	Reaction was slow
0.2	0.004	50	Reaction was faster
0.3	0.006	33	Reaction was very fast
0.4	0.008	25	Reaction was very fast
0.5	0.010	20	Reaction was very fast
0.6	0.012	17	Reaction was very fast
0.7	0.014	14	Reaction was very fast
0.8	0.016	12	Reaction was very fast
0.9	0.018	10	Reaction was very fast
1.0	0.020	9	Reaction was very fast

From the above results, it is evident that the rate of reaction increases with the increase in the concentration of the solution.

This is because the concentration of the solution is directly proportional to the number of molecules of the reactants per unit volume. As the concentration increases, the number of molecules per unit volume also increases, which leads to a higher frequency of collisions between the molecules, resulting in a faster rate of reaction.



Table 6-5

Prevalence, maintenance, discontinuation, and incidence of orders of restraints over 6-month period for Medicaid residents in a sample of nursing homes in Texas, 1984-1986.

<u>Independent Variable</u>	<u>Prevalence</u>	<u>Maintenance</u>	<u>Discontinued</u>	<u>Incidence</u>
Overall	13.1 (591/4509)	93.8 (270/288)	6.2 (18/288)	4.1 (92/2238)
1				
Hip Fracture				
Yes	14.8 (46/311)	96.2 (25/26)	3.8 (1/26)	8.8 (14/159)
No	13.0 (545/4198)	93.5 (245/262)	6.5 (17/262)	3.8 (78/2079)
2				
ADL (Transfer & Eating)				
Independent	1.6 (19/1198)*	94.7 (18/19)	5.2 (1/19)	1.1 (13/1179)*
Intermediate	8.9 (57/640)	89.5 (51/57)	10.5 (6/57)	5.5 (32/583)
Dependent	19.3 (515/2671)	94.8 (201/212)	5.2 (11/212)	9.9 (47/476)
Age				
< 65	14.8 (71/481)	97.3 (36/37)	2.7 (1/37)	3.5 (8/228)
65-89	12.4 (386/3105)	93.9 (184/196)	6.1 (12/196)	3.7 (57/1544)
90 +	14.5 (134/923)	90.9 (50/55)	9.1 (5/55)	5.8 (27/466)
1				
Diabetes				
Yes	12.2 (99/815)	90.5 (38/42)	9.5 (4/42)	2.4 (9/380)
No	13.3 (492/3694)	94.3 (232/246)	5.7 (14/246)	4.5 (83/1858)
Confused/Disoriented				
Yes	18.7 (539/2890)*	94.5 (258/273)	5.5 (15/273)	5.4 (74/1383)*
No	13.2 (52/1619)	80.0 (12/15)	20.0 (3/15)	2.1 (18/855)

\*

p < .001

1

Based on occurrence of ICD-9 codes for condition among any of five listed diagnoses.

2

Independent is defined as independent (independent, supervised, or minimum assistance) in transfer and eating; intermediate is defined as dependent (requires moderate or maximum assistance or is tube-fed) in either transfer or eating; dependent is defined as dependent in both transfer and eating.



## CHAPTER 7

### CROSS-COMPARISON OF DATA COLLECTION SYSTEMS

This chapter reviews the data collection systems used by the primary sources of data for this study: National Health Corporation, New York, and Texas. This chapter summarizes and compares the three approaches to collecting data about nursing home residents and offers insights into the comparability and usefulness of the information obtained. The critique which follows will be helpful in planning new data collection efforts and developing comparable data systems in nursing homes.

Issues and items focused in on this cross-comparison relate to the longitudinal outcome analyses presented in Chapters 4, 5, and 6. Other areas which could be used as quality indicators or case-mix adjusters, such as therapies, drugs, diet, and care planning, have not been addressed in this chapter, mainly because we did not use those data in this study. This comparative analysis has generated caveats, both specific and general, about cross-walking data elements and identifies several issues for future consensus building. Cautions about the comparability of the results from analyses conducted on these data sets are addressed in Chapter 8.

#### Overall Data Collection Systems Issues

##### Purpose and process of data collection

The purpose of a nursing home's data collection system shapes the way data are collected, the intensity of the system's implementation and the types of data collected. The instruments and systems reviewed here are not inherently good or bad. These three the data collection efforts were designed to meet different administrative goals, not to specifically analyze outcomes in a research setting. Each was designed at a different point in time and reflects changes in the state-of-the-art of nursing home assessment systems. However, the resulting approaches are in many cases similar, which has allowed us to make the cross-system comparisons which are presented in this report.

The National Health Corporation (NHC) collects resident assessment data for administrative purposes. Assessment data collected by nurses at the facility are used to monitor patient changes as well as for staffing and planning purposes. More in-depth analyses are conducted from time to time on specific areas such as monitoring for drug interactions and risk factors for development of decubitus ulcers.

New York's data collection system is designed to categorize residents in resource utilization groups for reimbursement purposes. The purpose of the Patient Review Instrument (PRI) is to generate the case-mix of each facility in the state using Resource Utilization Groups (RUG-II). RUG-II categories incorporate clinical and functional parameters but were empirically based on nursing staff time.

Texas collects assessment data on Medicaid residents in all nursing homes in order to determine the level-of-care for reimbursement. The reimbursement level is based on the categorization of ICF or SNF.





### Mechanics of data collection

The National Health Corporation nursing staff perform their assessments on a monthly basis for SNF residents and at three month intervals for ICF residents. In addition, residents are assessed at admission, at discharge and at the time of a change in level-of-care. In addition, a follow-up interview is conducted by telephone three months after discharge to determine post-discharge destinations. This structure is consistent with the longitudinal assessment of individual residents.

In New York, PRI assessments are generally done by nurses from the facility, however they must be trained and certified by the State in order to complete the data collection form. At 6-month intervals all residents in a facility are assessed. There is also a quarterly assessment cycle scheduled for new admissions. No specific discharge or change in level-of-care records are incorporated in this system.

The frequency of data collection in Texas was not specified, and was found to be variable. The most common pattern was assessments at 6-month intervals. Discharge information is collected on a separate Transaction Notice which records resident identification information, level of care, and the disposition of the transaction, but not assessment data. A separate Patient Transaction Notice is completed when a resident is admitted, discharged, or changes rooms, but this transaction form only notes the transaction. It is consequently not possible to directly relate change in resident status to a transaction or to identify resident status at the time of the transaction.

### Form layout

Both NHC and Texas data are collected on one page forms. NHC's form contains abbreviated response categories along side of the blank for the response code. The Texas form contains abbreviated instructions for coding on the reverse side of the form; detailed coding documentation is generally not referred to when the form is completed, meaning that the abbreviated instructions are all that are used. Although the one-page format is convenient, small type and lack of definitions may affect the accuracy of the completion of the forms particularly when the forms are completed by many different individuals, such as in a state-wide system.

The New York PRI requires 3 or 4 pages; the longer form was the newest revised version. Despite its length, the New York form contained the fewest data elements. The paper version of the form uses a larger type font and bigger boxes for coding the response than either NHC or Texas, facilitating clearer completion.

Complete definitions for the more subjective ADL and behavior items are included on the PRI coding forms. Facilities in New York are not required to fill out the actual paper form, and many facilities complete the assessments directly on a computer. The computerized data entry routines being used do not necessarily follow the paper form's layout, therefore advantages specific to the form may not be characteristic of the system.





## Accuracy

Our analyses of the data did not include verification of the accuracy of the data. Where possible, we did test for completeness and inconsistencies in the data we received. In general, the records were complete and contained few inconsistencies. Comparisons of results across the data sets are presented in the next chapter.

Items which are not actually used by the individual or organization who collect the data may not be as accurate, especially in the presence of time and staffing constraints. Special incentives, such as tying particular items to reimbursement or inspection of care audits, may influence the accuracy and/or consistency of selective items.

## Auditing

Auditing procedures varied across the systems by the amount of data audited, who conducted the audit, and the implications of data errors. An auditing process established as part of the data collection system is the best means of verifying data in a timely fashion. The timeliness of audits is stressed because a resident's status, and even presence in the facility, is subject to change. Adherence to an auditing protocol and clear objective definitions, for both the assessor and auditor, are critical to ensuring good quality data.

In NHC, a 10 percent sample of assessments is audited quarterly by Corporation nurse consultants to ensure accuracy. In New York, if assessments from a facility are found to be inaccurate, the facility risks losing the right to complete its own assessments; instead, State nurses will complete the assessments and the facility will be billed for this expense. In Texas, only the items used for Medicaid reimbursement are verified by the State: client identification number or social security number, facility vendor number, and residents' level-of-care.

## Updating

Beyond the accuracy of individual assessments, an ongoing data base for nursing home residents needs to incorporate mechanisms for updating the status of residents. Analyses presented in Chapter 2 illustrate the frequency of changes in physical functioning experienced by a cohort of new admissions to the nursing home. While the frequency and timing of periodic assessments is often driven by cost constraints, these analyses support the need for frequent assessments, particularly during the first months of stay.

Regardless of the scheduling of subsequent assessments performed on residents who remain in a facility, the new assessment should not be unduly influenced by prior assessments. In the Texas system, the responses from the previous assessment were returned to the facility on a computer generated form for updating. The pre-printed assessment is supposed to provide a template for updating; in practice, the pre-printed values were often retained inappropriately. We do not know the extent to which assessors in NHC or New York refer back to the previous assessment.

Neither the "turnaround form," a form pre-printed with the last set of responses which is edited as needed, nor computerized prompting with the

The first part of the paper discusses the importance of the study of the history of the English language. It is argued that the study of the history of the English language is essential for a full understanding of the language and its development. The paper then goes on to discuss the various factors which have influenced the development of the English language, such as the influence of other languages, the influence of social and cultural changes, and the influence of technological advances.

The second part of the paper discusses the importance of the study of the history of the English language. It is argued that the study of the history of the English language is essential for a full understanding of the language and its development. The paper then goes on to discuss the various factors which have influenced the development of the English language, such as the influence of other languages, the influence of social and cultural changes, and the influence of technological advances.

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previous assessment information, are optimal methods to use to achieve unbiased updating of information. Filling out a new form at each update would likely yield more accurate assessments, although this approach is undoubtedly more time consuming. A large-scale study would be needed to quantify the trade-offs of improved accuracy versus the additional costs involved.

Incentives for updating also vary across by data system. NHC's subsequent assessments not only document patient changes, but also determine staffing levels. In New York, results of the assessments determine the facility's reimbursement level for the next six months. Although the Texas Medicaid assessments also determine reimbursement, the only change in reimbursement would be for residents who change level-of-care; level-of-care changes are not common, particularly in a state with few SNF beds.

### Types of data collected

#### Scope

In examining the comprehensiveness of a data collection system, the trade-off between the amount of time needed to perform the assessment of the resident or review the chart and fill out the form and the usefulness of items on the form must be considered.

In some instances, minor modifications to clarify definitions or separate response codings could broaden the comparability and utility of existing data sets. In most cases these modifications could be made with little change to the existing data collection systems.

The NHC data collection system incorporates the widest range of items, covering resident's personal and demographic characteristics, functional ability, health status, treatments and services, including medications. In addition, discharge information is collected along with a complete discharge assessment. Categories are generally well-constructed and defined, although some items require more subjective judgment than others (i.e., judgments of mental status and behavior problems compared with judgments of functional ability). Disposition at discharge and a complete discharge assessment are collected.

The New York PRI includes few items which do not factor in the reimbursement structure (RUG-II). The functional items included are also limited to those in the RUG-II algorithm; the structure of these items reflects an emphasis on services required and not necessarily residents' functional abilities. Although several items concerning behavior problems are included, there is no specific assessment of residents' mental status. Discharge information is not included, as the assessments are performed on current residents only.

The Texas Department of Human Services Level-of-Care Assessment is conducted on Medicaid residents only. While the majority of residents are covered by Medicaid, data about all residents in the facility would be needed to conduct facility-level analyses. Areas covered on the assessment form include diagnoses, medications, functional assessment, disabling conditions, and nursing procedures, as well as the physician's evaluation and recommendation regarding level-of-care. Transaction Notices document admissions and discharges, but do not include assessment of the resident.





What should be collected in any given system depends on the anticipated uses of the data. Capitalizing on existing research and scientific literature combined with input from clinical experts will enable development of systems which can fill the roles of both quality assurance (by linking process and outcome) and resource consumption (such as care planning, staffing, and case-mix reimbursement).

## ADL Items

### General approach to assessing ADL

The main issues in measuring physical functioning using ADL items are the range of items covered and their definitions, specifically the coding categories. Depending on the purpose of collecting the data, items may reflect a resident's capacity to perform the activity, whether the resident actually performs the activity, or the amount of staff help needed to perform the activity. Different inferences may be made from each of these approaches to measurement. In evaluating these different approaches, the specific purpose of the use of the data will be of primary importance in the selection of a best approach. However, comparability or compatibility with other approaches, particularly those used in the past, can often be achieved while fulfilling the purpose of a new system.

Some items have comparable categories across data sets, particularly if some flexibility is allowed regarding collapsing of categories. However, each category will not always have a directly corresponding set of response codes. In cross-walking items across data sets, one needs to be sensitive to possible institutional policies or practices which might influence results. For example, a facility policy of supervising all baths would make residents in that facility appear more dysfunctional than residents in facilities which permit residents to bathe independently. Despite a lack of direct comparability, similar frequency distributions may be achieved for given items, particularly when dichotomous groupings are used. A chart comparing the functional variables in these three data sets appears in Figure 7.1

Cross-data set comparisons are made more difficult when ADL are used in combination to create a summary scale. Here slightly different definitions or codings can compound differences in the items and make it difficult to discern whether differences across data sets are due to differences in the population studied or the type of information collected. A more dramatic and obvious lack of comparability occurs when attempting to create a scale which requires items or categories which are not readily available on a particular assessment instrument. Substitutions can be made or the scale could be modified, however the resulting metric would not retain the measurement properties, such as validity and reliability, of the original scale.

NHC collects information on six activities of daily living using a three category response. These activities are: bathing, dressing, toileting, transferring, feeding, and grooming. Residents are assessed as to whether they need no help, need help, or are unable to do each activity. In addition, the Patient Evaluation Abstract contains an overall measure of mobility labeled "walking/wheeling" and separate measures for bladder continence and bowel continence.

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## RESEARCH INTERESTS

My research interests are in the area of

the synthesis and properties of new materials.

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new materials with unique properties.

My research is supported by the National Science Foundation.

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The New York ADL assessment includes only toileting, transferring and eating, and includes a mobility item. The toileting measure combines the concepts of ability to toilet one's self, incontinence of bowel and/or bladder, and scheduled toileting. Categories of these items are defined in terms of the amount of supervision/assistance needed. Subtle distinctions between response categories are highlighted on the data collection form and to an even greater extent in the detailed instruction manual.

Texas Medicaid residents are assessed in terms of the following functional abilities: mobility/ambulation, transferring, bathing, dressing/grooming, toileting, and eating. Each of these items is scored on a 5 category response scale ranging from independent to maximum assistance. The subjectivity of categories, such as "supervised" and "minimal assistance," do not provide objective clarity to contrast between levels of assistance required; this coding structure likely contributes to the instability of the ADL measures.

#### Bathing, dressing, and grooming

Bathing, dressing, and grooming are each separate items in the NHC system, while none of these are contained on the New York PRI. Texas' form includes bathing, but combines dressing and grooming into one item. Each are important functions for maintaining quality of life, whether they are performed independently by the resident, with assistance, or by staff of the facility.

These three ADL items fine-tune the measurement of functional abilities of residents at the more functional end of the ADL spectrum. This information is also particularly useful for residents with discharge potential. Although these items complement the other activity measures, in a typically dysfunctional nursing home population, these activities provide little discriminating power in characterizing residents' functional abilities or staff time.

#### Eating or feeding

Each of the three data sets assess residents' abilities to feed themselves. The importance of this variable is substantiated by our analyses which show that residents who need to be fed have substantially different outcomes from those who need no help or require some help. The New York PRI has a separate category for tube fed-residents; in the NHC and Texas data the tube fed category could be constructed from another item.

#### Transferring

The ability to transfer from bed to chair was also collected in each of the data sets we analyzed. Only the New York PRI included a separate category for residents who do not transfer, that is, residents who are not gotten out of bed. This category provides insight into the resident's profile beyond the characterization of "unable" or requires "maximum assistance" to transfer. It also contrasts not needing staff time to transfer because the resident is independent with not needing assistance because the resident does not get out of bed.

#### Mobility/Walking-wheeling

Measures of mobility were also included in each of these three data sets.





Mobility needs to be clearly defined as different from transferring; a resident's actual ability to move from place to place, as distinct from the ability to go from bed to chair or from standing to sitting, is an important aspect of that individual's functional status. Due to the high use of wheelchairs in nursing homes, response codes should contrast walking ability (ambulation) from wheel chair mobility. Definitions, and preferably the coding structure, should clarify how to categorize the use of appliances such as walkers and canes.

#### Toileting and continence

Both NHC and Texas address the ability to toilet separately from continence, while the two issues are combined in the New York PRI (See Figure 7-1). The amount of assistance needed to use the toilet should be assessed separately from bladder and bowel functioning or continence. As with the transfer variable, consideration should be given to the inclusion of a specific category for residents who are not toileted. Regardless of the structure of the items, definitions must clearly identify the proper categorization for residents with catheters and ostomies. With appropriate categories, bladder continence and bowel continence could be incorporated into one item, such as in the Texas coding scheme, with additional categories for occasional incontinence.

#### Diagnoses

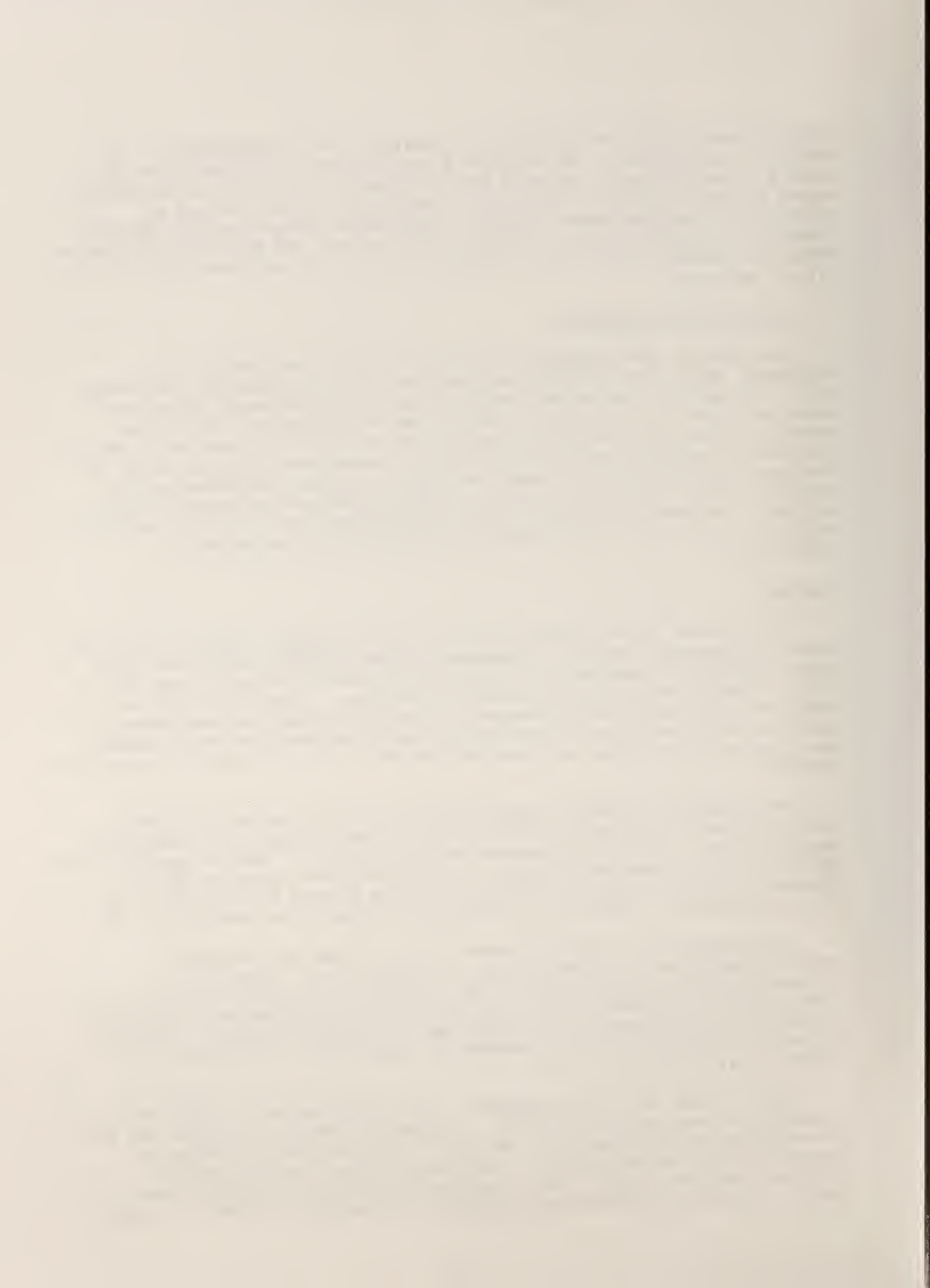
Data systems varied in both the definition of primary diagnosis and in the number of diagnoses recorded. Diagnoses listings were all coded using ICD-9 codes. Additional diagnoses were sometimes obtainable through a check list of items recording the presence of specific conditions. Where such separate conditions were specifically assessed, we generally found that more cases of a condition were identified and more changes could be identified when disease-specific check list items were examined than when lists of diagnoses codes were scanned.

NHC records one primary diagnosis and up to eight secondary diagnoses. Primary diagnosis is defined as "The diagnosis that necessitated admission or continued care." Secondary diagnoses are those that "... have an impact on the patient's current therapeutic regime." The manual also indicates that the diagnosis list may require updating, including a revised designation of the primary diagnosis. However, in practice, this updating was not usually done.

New York records primary diagnosis only, defined as "the medical condition requiring the largest amount of nursing time." This is not necessarily the same definitional focus as other data systems. In addition, listing only one diagnosis limits the ability to study diagnoses which may be present but are not necessarily considered as "primary" because of the amount of nursing time they require or because of another more nursing-intensive diagnosis may be present.

Texas records up to five diagnoses. The month and year in which the diagnosis was made are also included, although for long-term problems the date is admittedly an approximation. The first listed diagnosis is the primary diagnosis, which is defined as "...the primary reason that the recipient receives long-term care." Other diagnoses "...are used to indicate other medical factors that have direct bearing on the medical treatment or nursing





care required."

Diagnoses, alone or in combination with other information, may be used as prognostic indicators or risk factors, incorporated in care planning and evaluation, and measured as outcomes. The diagnoses focused on in this study include hip fracture, congestive heart disease, diabetes, urinary tract infection, contractures and decubitus ulcers. These were chosen as potential case-mix adjusters and as outcomes, but were selected in light of the manner in which diagnosis information was collected in these systems.

#### Hip fracture and congestive heart disease

Both these diagnoses, hip fracture and congestive heart disease, were identified from the ICD-9 diagnoses listings for all three data sets. In the New York data set, this refers to the one diagnosis which takes the most nursing time, consequently only one diagnosis is listed and it reflects an active problem. Although the Texas data set includes an approximate date of diagnosis, secondary diagnoses may be active problems or merely reflect a history of hip fracture or heart disease. In none of the systems can the severity of either of these chronic conditions be assessed.

#### Diabetes

Diagnosis of diabetes was obtained from ICD-9 listings for NHC and Texas and from a specific yes/no item for New York. The chronic nature of diabetes and its irreversibility make its inclusion in the ICD-9 code listings more likely than diagnoses of shorter duration. The rates of diabetes across the three data sets were reasonably comparable, ranging from 14 to 18 percent. Despite the lack of measurement of severity of the diabetes or how well it was controlled, diabetes was associated with some of the outcomes tested in all three data sets (See Chapter 8).

#### Urinary tract infection

Urinary tract infections (UTIs) are more prevalent in the elderly than in younger persons and are particularly common among elderly residents of long-term care facilities. Their often short-term but recurring nature makes their measurement a challenge for longitudinal data bases. The presence of UTIs need not only be assessed at a given point in time, but reassessed and updated on an ongoing basis to ensure up-to-date information.

For both the Texas and NHC data sets, presence of UTIs was available only through scanning the list of diagnoses. In the Texas data base, despite up to five diagnoses being recorded, no cases of UTI were listed in the population we studied. The NHC data set showed many cases of UTI, but a very high rate of maintaining the infection over the six month study period. These findings suggest that diagnosis listings, at least as they are presently used, are not a good way to detect the presence, or change in the presence of urinary tract infections.

New York's approach to measuring urinary tract infections is the inclusion of a separate UTI item, coded yes or no. The definition of UTI used in the PRI permits individuals to be coded as "yes" solely on the basis of symptoms of a UTI as long as laboratory test have not ruled out an infection. The combination of the specific yes/no item and a more lenient definition resulted

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in rates of UTI being much higher in New York than in the other data sets. Similarly, the recovery and incidence rates in New York were more consistent with rates expected based on clinical experience.

The clinical world has not reached consensus on a standard definition of what constitutes a UTI. Their often short-term duration, resistance to treatment, and tendency to repeat makes the recording of such a diagnosis difficult even if a standard definition did exist. In order to be able to pick up changes, clear time frames need to be spelled out: Should the case definition include active UTIs at the time of the assessment (point prevalence) or the presence of a UTI at any point in time over some previous time frame (period prevalence)? It would be possible to include when signs and symptoms of the episode were first noted to detect whether the UTI being recorded is of recent onset, a long-standing problem, or a recurrence.

Depending on the use of the data, one might be interested in signs and symptoms of a UTI or just laboratory confirmed diagnoses. Consistent criteria for translating laboratory results into a diagnosis also need to be developed. However, confirming the presence of organisms may be less important, and it may be more relevant to focus on the signs and symptoms. Prompt identification of the problem would permit interventions prior to becoming a laboratory confirmed diagnosis.

### Contractures

The prevalence and incidence of contractures are useful as negative indicators of quality of care because they are, to some degree, preventable. None of the data sets record date of onset or specifically identify any diagnoses as contributing factors, although the latter might be inferred from the list of ICD-9 codes. Contractures may be more likely to be recorded if they are severe or long-term such as those present at the time of admission, and therefore would not represent the full spectrum of the condition.

In the NHC data set, information about contractures is limited to the list of ICD-9 codes, complete with the problems of recording and updating of diagnoses. In New York, contractures are recorded using a specific yes/no item. As such, neither the severity nor the number of limbs involved is available for either additional description or for monitoring progress. The coding manual, although not the data collection form itself, specifies that contractures must be carefully differentiated from paralysis or spasticity.

By contrast, in Texas, one item assesses both contractures and paralysis. The extent of involvement is measured by the number of limbs (extremities) affected, not by recording range of motion testing.

The combining of contractures and paralysis in one item makes it impossible to differentiate the two conditions. A graduated coding scheme would permit the differentiation of minute impairments detected in the course of a full range of motion assessment from impairments severe enough to limit ADL or to cause modifications or adaptations of daily activities. For standardized assessments, definition and implementation needs to insure that the determination of contractures is the same regardless of who performs the assessment and whether or not special therapies are available to the resident.





## Decubitus ulcers

The extent of decubitus ulcers in the nursing home population merits particular attention. Pressure sores are quite prevalent, yet can often be prevented, or at least successfully treated. Each of these data sets contained specific item(s) regarding decubitus ulcers. NHC recorded four separate items for the number of sores in each stage (I-IV) of severity. New York's form contained one item for highest (most severe) level of decubitus ulcer. Texas also had one item, coded in terms of single/multiple sites with dressing/no dressing required.

Staging definitions are well documented in the medical and nursing literatures and appear to be widely used, except perhaps the practice of reporting of Stage I sores. Measuring severity by the use of dressings and the number of sites affected may be easier to report by less trained staff, but may also vary more with practice patterns than patient condition and is therefore not necessarily a measure of severity.

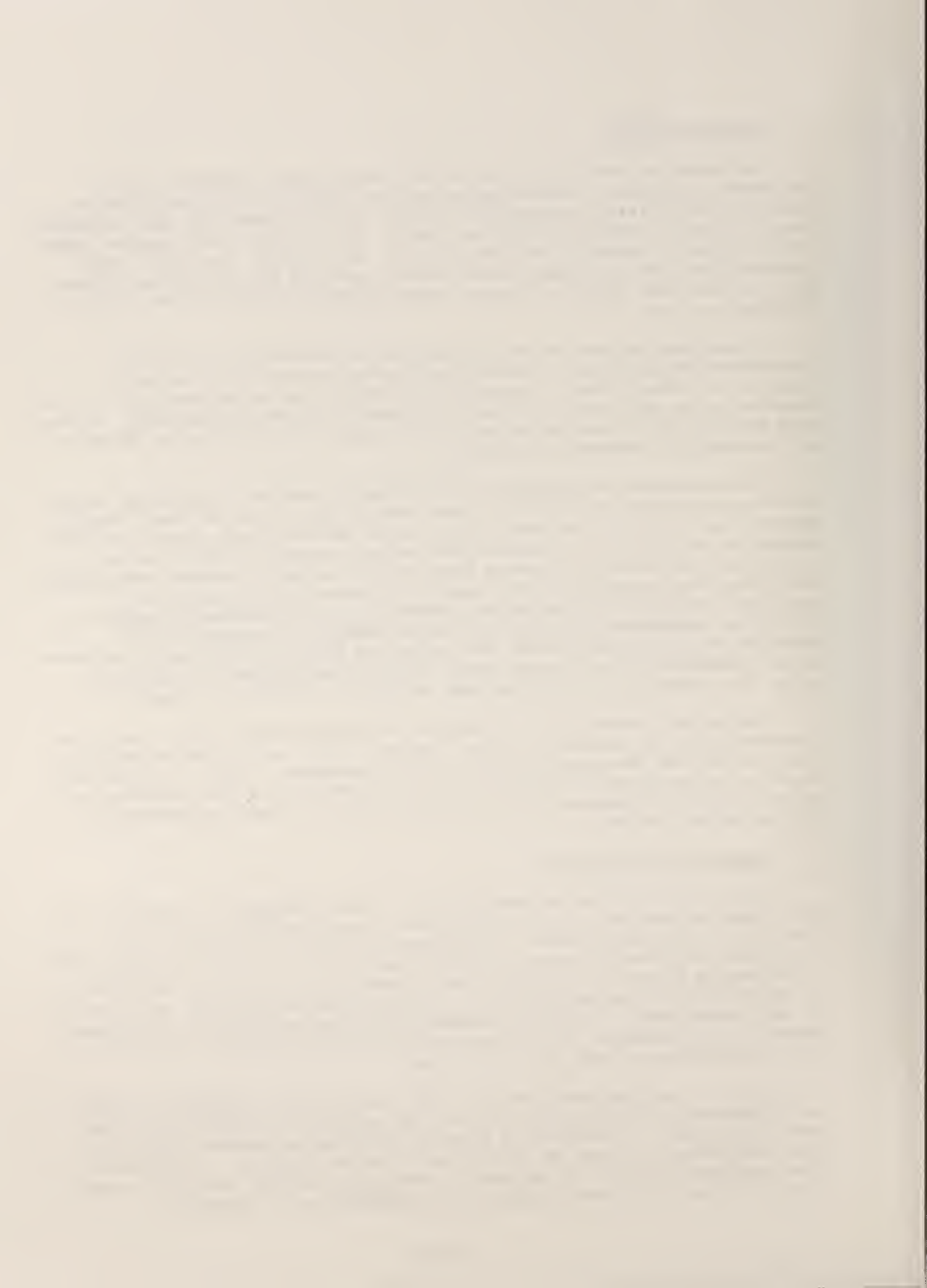
In our analyses we focused on the presence of any sore, regardless of the number or the severity, and transitions from no sore to any (or many) sore(s), and from any sore(s) to no sore. These remain somewhat crude measures in that changes in the status for residents who maintain decubitus ulcers are not reflected. The number of sores at each level of severity provides considerably more information than simply the stage of the worst sore or the use of dressings. However, such extensive information is not necessarily useful in that it is cumbersome to present for large numbers of residents without reducing the information to the total number of sores or the stage of the worst sore. Regardless of the measure used, tracking the progress of individual sores for a population of nursing home residents is difficult at best.

The optimal frequency for collection of decubitus ulcer data is not known. Pressure sores can develop in a short period of time; sores might exist for weeks before they were recorded in a routine assessment. While the stage and number of sores quantify the severity of the problem, this does not necessarily allow tracking of progression of individual sores or overall improvement or decline of the resident.

## Discussion of diagnoses

While there is value in zeroing in on a single diagnosis to identify the most important problem, in the nursing home population there may not be a single most important problem. Guidelines to select one diagnosis from a host of ailments may produce erroneous information, or at best, fail to portray a comprehensive picture of the individual's condition. If multiple diagnoses are to be recorded, inclusion criteria or rules for ranking diagnoses would need to be well established. Secondary diagnoses which are considered complications, impact on care planning, or the expectations regarding quality outcomes may be best collected using specific yes/no items.

Results from this study indicate that using lists of diagnoses, at least as implemented in NHC and Texas, is not the best way to identify short-term, acute conditions. A checklist of specific diagnoses of interest would be a good supplement to either the primary or a list of diagnoses. Completion of the checklist would need to be done in such a way that the conditions weren't simply checked off from an incomplete or outdated list of diagnoses.



If other specific diagnoses, such as Alzheimer's disease or AIDS, are of particular interest, special procedures to insure identification of such diagnoses may need to be developed. In developing criteria for specific diagnoses, such as UTI, strict definitions likely underestimate the problem and may only identify either severe or long-term cases. Criteria which are too broad or loose may produce extremely high rates for conditions. Clinical experts should consider the pros and cons of the inclusion of gray areas: mild cases or signs and symptoms.

Regardless of how diagnoses are recorded, updating needs to be done, both to provide an accurate picture at any given time and to indicate changes in the patient's condition. For nursing home residents, the interest is not necessarily focused on admission diagnosis, particularly when a longitudinal data base would contain that information on an earlier record.

### Clinical and service measures

NHC collects information on receipt of a wide range of services and treatments; data are recorded by having the assessor copy code numbers corresponding to all which apply. New York's PRI and the Texas Medicaid instrument use a check list approach, requiring responses to each of a series of medical conditions and treatments, rather than checking all that apply or an open-ended listing approach. Texas codes the frequency or severity of each condition while New York simply records a yes or no response. This yes or no approach is felt to result in more accurate reporting for many of these items, although less information is provided.

The clinical and service measures used in the longitudinal analyses presented in Chapters 4-6 are discussed here. These include: urinary catheter, mental status, comatose, clinically complex, bowel and bladder training, and restraints. This is not meant to be an exhaustive list of all relevant clinical and service measures. These variables were available in the data and were identified as potential case-mix adjusters for the specific outcomes analyzed.

### Catheter

The National Health Corporation includes urinary catheters in the assessment of bladder functioning, distinguishing between the use of external and internal catheters. New York's PRI had a separate item specifically for catheters, coded yes or no. Texas also has a separate item for catheter use, but rather than yes or no, specifically codes the type of catheter: PRN, Foley (indwelling), suprapubic, or 3-way irrigation.

There does not appear to be a consensus on how best to record catheter use. Dates of insertion and removal would reduce the frequency with which assessments would need to be made. Other issues which need to be addressed include the following:

- Does the specific type of catheter matter? Should external catheters be coded separately from indwelling catheters?
- Especially when measuring change in catheter use, what time frame should be measured? Should the case definition include use only at the





time of the assessment or the use of a catheter at any point in time over some previous time frame? If so, what time frame?

- Should PRN catheter use be included? Catheter use to empty a bladder once or to obtain a specimen?

### Mental status

In the data sets used in this study, as in other assessment tools, widely different, often subjective, criteria are used in assessing mental status. This makes the comparability of the mental status items questionable. Frequently, aspects of orientation, memory, and behavior status are combined in one item. Several reliable mental status questionnaires, designed to be administered to the resident, are available; however, these may be impractical for use in ongoing assessments of nursing home populations. More objective, reliable means of using measures of staff judgement of the residents' mental status are needed.

The objective in using a mental status measure in our analyses was to distinguish residents who were confused or disoriented from those who were not. In NHC this variable was constructed from the "disoriented" category of the Orientation item. In Texas, we used the moderate impairment, severe impairment, and incoherent categories of the "Orientation and Memory" item.

No assessment of residents' mental status is included on the New York Patient Review Instrument. Although the PRI contains four measures of behaviors, no item analogous to confused/disoriented is included. In developing the RUGs algorithm mental status was not related to nursing staff time. However, our analyses did show relationships between mental status and several outcomes in both the NHC and Texas data (See Chapter 8).

### Comatose

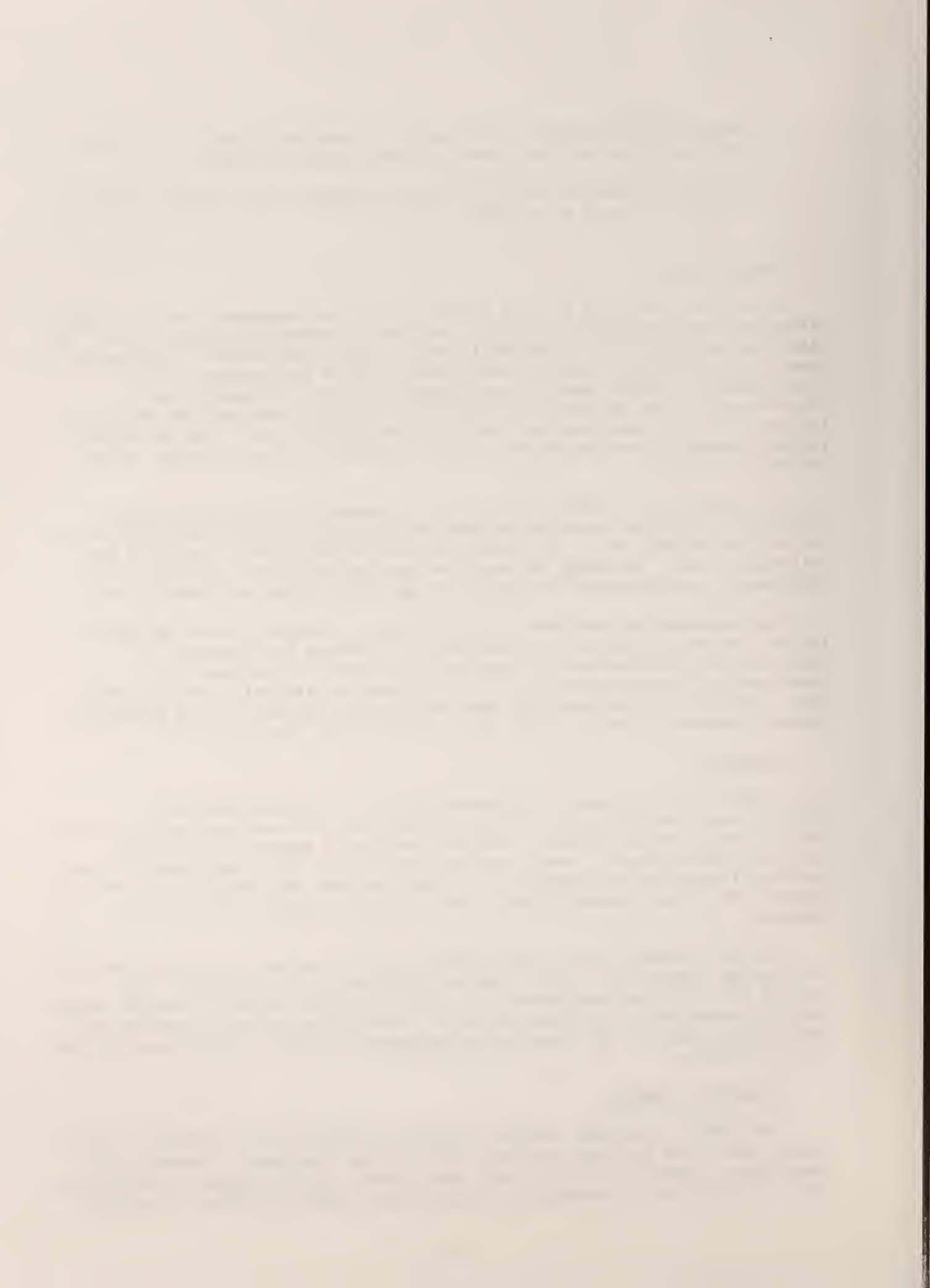
In NHC, the assessment of comatose state was obtained from the "Orientation" item, using a different category of the same item which was used for the mental status measure. New York includes a separate item for comatose, coded yes/no. Texas' coding structure for the "Consciousness" item included five response categories, of which semicoma and coma were the two most severe. The Texas documentation did not contain a precise definition of semicoma.

The low prevalence and varied definitions of comatose state contribute to its lack of promise as a useful case-mix adjuster for most outcomes (See Chapter 8). With the development of a more consistent measure, comatose state might be useful as an exclusion criteria, either alone or in combination with other conditions, for the computerized generation of care planning and or case-mix adjustment.

### Clinically complex

The RUG-II Clinically Complex variable is coded yes for residents without severe behavioral problems who have the following treatments, diagnoses, or conditions: physician care at least once a week, oxygen therapy, wound/lesion care, chemotherapy, transfusions, dehydration, internal bleeding, terminally





ill, stasis ulcer, cerebral palsy, urinary tract infection, hemiplegia. The objective in using this variable was to identify the more acute case residents in the nursing home.

In that the New York PRI was created to construct the RUGs categories, all the relevant information is readily available. For the NHC data set, the RUGs algorithm was approximated by combining clinical and treatment items; some approximations were made with respect to particular definitions and time frames, but the resulting algorithm is felt to be reasonably comparable. The Texas form does not collect data on all the treatments and services needed to construct the clinically complex criteria and the subset of information available provides a poor approximation for both the specific category of Clinically Complex and RUG-II as a whole.

In constructing this variable across data sets, the approximation of various components of the algorithm and uncertainty over the consistency of their updating are cause for some concern. Also to be considered is the influence of practice patterns in the frequency of physician visits and designation of resident as terminal. Whether or not this algorithm is successful or consistent in identifying the most acute residents across the data sets has not been explored in this study. A more detailed analysis of which components of the algorithm are important in predicting outcomes may be required before adopting the clinically complex category as a nursing home adjustment variable.

#### Bowel and bladder training

NHC includes Bladder Training and Bowel Training as two of the many rehabilitative services offered. If provided, either or both services are coded in terms of type of service (rehabilitation or maintenance), frequency, and whether or not rehabilitation or maintenance are achieved.

New York uses one item for Bowel and Bladder Rehabilitation, coded as yes/no. Criteria for defining a bowel/bladder regimen are quite detailed, suggesting that what might be called bladder/bowel program in another system would not necessarily meet New York's criteria.

Texas' categories for Bowel/Bladder Training include two responses that essentially mean the service is not ordered, however the responses distinguish whether the resident is continent or not. Other categories differentiate the types of training ordered, but not necessarily received: bowel, bladder, or both.

In cross-system comparisons, the varied definitions of bladder and bowel training are important to note, especially in contrast to a scheduled toileting routine. Also important in comparing results across populations are the rates of incontinence and catheterization which would affect the proportion of residents eligible for such a training program. Specifying bowel training versus bladder training may be useful for documenting outcomes of the specific rehabilitation effort, although the low frequency with which either of these services is provided suggests that one item for either type of training may be indicated.



## Restraints

Each of the three data systems collects information about the use of restraints. The National Health Corporation collects two items separating restraints by purpose for use -- restraints for safety and restraints for control; each item is coded by type of restraint (physical, chemical, or both types). New York specifies that the restraint be the use of physical restraints during daytime only and is coded as yes/no. Texas' categories differentiate between none needed/ordered, the PRN or daily use of protective/supportive devices, and the daytime (waking hours) or continuous use of restraints.

Differences in definition, particularly with respect to the inclusion or exclusion criteria for specific types of devices or medications can lead to dramatically different conclusions (see Chapter 8). Another important distinction is the difference between orders for use and actual regular use of the restraints. The use of protective/supportive devices such as leg braces or heel pads are measured with the same item as restraints in the Texas data; while information about the use of these devices may be of interest, they are not appropriately called restraints. In general, actual use of physical restraints during the day are of most concern.

## Miscellaneous Issues

### Record linkage

Of particular interest in this study had been the ability to link records on residents over time to provide an ongoing picture of their nursing home stay. Each of the data bases have patient identification numbers which allow linkage of multiple records for the same individual. With expanded record linkage, analyses could examine service use across medical care delivery settings, over longer periods of time, and across payment sources.

The Texas and New York data use Social Security numbers (SSNs) as identifiers. Although these identifiers were encrypted for our research purposes, the potential does exist to link Social Security numbers, Medicare or Medicaid numbers to other data sources such as death certificates or the National Death Index, hospital, physician and other medical care utilization records and cost data through HCFA or State claims tapes.

Lack of a Social Security number was a problem in both Texas and New York, perhaps because both states border foreign countries. In addition Railroad Retirement beneficiaries do not have SSNs. The New York State Department of Health Institutional Review Board did not want to provide unencrypted identifiers to us; the state even had difficulty getting some facilities to comply with providing SSNs on PRI forms.

In NHC, SSN is not routinely collected. The facility-generated patient identifiers which are used allow record linkage within a given facility. Linkage across NHC facilities or to other facilities is not possible. However, an individual's records can be matched with records of other admissions if the person was admitted to the same facility more than once.



The first part of the report deals with the general situation of the country. It is found that the country is in a state of general depression, and that the people are suffering from want and distress. The cause of this is attributed to the failure of the crops, and the consequent loss of the people's livelihood. The report also mentions the fact that the government has not been able to do much to relieve the people's suffering, and that the people are therefore turning to the government for help.

The second part of the report deals with the financial situation of the country. It is found that the government is in a state of financial ruin, and that the people are suffering from the consequences of this. The report also mentions the fact that the government has not been able to do much to relieve the people's suffering, and that the people are therefore turning to the government for help.

The third part of the report deals with the social situation of the country. It is found that the people are suffering from a general state of poverty and distress, and that the government has not been able to do much to relieve the people's suffering. The report also mentions the fact that the people are turning to the government for help, and that the government is unable to do so.

The fourth part of the report deals with the political situation of the country. It is found that the government is in a state of general confusion and disorder, and that the people are suffering from the consequences of this. The report also mentions the fact that the government has not been able to do much to relieve the people's suffering, and that the people are therefore turning to the government for help.

The fifth part of the report deals with the military situation of the country. It is found that the army is in a state of general weakness and disorganization, and that the people are suffering from the consequences of this. The report also mentions the fact that the government has not been able to do much to relieve the people's suffering, and that the people are therefore turning to the government for help.

The sixth part of the report deals with the foreign situation of the country. It is found that the country is in a state of general isolation and poverty, and that the people are suffering from the consequences of this. The report also mentions the fact that the government has not been able to do much to relieve the people's suffering, and that the people are therefore turning to the government for help.



### Discharge and post-discharge information

Our analyses have made use of disposition at discharge where that information was available. Specific discharge records, such as those for NHC and Texas, provide a greater degree of certainty that a discharge has taken place than merely the absence of a scheduled assessment. Disposition at discharge (discharge destination) has provided additional insight into outcomes and the continuum of care of nursing home residents. We recommended that when collecting information on discharge destination/disposition that a category for home health care be added to existing measures.

Full assessments done at the time of discharge, in addition to discharge destination/disposition, are a useful source of information in examining trends in residents' health history during their stay in the facility. This type of discharge assessment is completed by NHC. Although the time period corresponding to an assessment performed as a result of death is unclear, full assessments for residents discharged to home or to other health care facilities will become increasingly important if the potential for record linkage is expanded.

NHC also conducts a follow-up interview by telephone three months after discharge. Data collected are limited to subsequent locations of the individual and when and where death occurred. This post-discharge follow-up is expensive but provides information which has been useful to the facilities as well as to researchers.

### Discussion

Strengths and weaknesses of the data systems presented in this chapter have been identified from an attempt to use the data sets for purposes other than those for which they were designed. The ambiguities and lack of comparability of case definitions highlighted in this chapter have led to conclusions and recommendations for improving existing systems and developing new nursing home assessments. This analysis of the data systems also emphasizes the need for caution in drawing conclusions which are too strong for the cross-data comparisons to support.

In developing or revising a data collection effort for nursing homes, one needs to incorporate solid clinical expertise without losing sight of the reasonableness of the specifications of what, by whom, and how often to collect information. The nursing home industry is a dynamic field; developers of new data collection systems need to acknowledge that there will be a need to reassess, and likely to revise, what gets measured and how the data are processed.

A widely implemented, standard assessment tools will not achieve the desired comparability unless ongoing training and auditing procedures are also incorporated. New systems will need to be sensitive to existing data collection efforts currently in place at both the state and facility level. A standard system should consider the possibility of focusing on a core minimum set of items to maximize comparability. A philosophy of constructive tolerance for additional items will allow for preservation of individuality and allow for improvements and possible innovations within a standard system.



Figure 7.1

Comparison of functional variables in the National Health Corporation, New York, and Texas data

National Health Corporation	New York	Texas
<b>BATHING</b> 1=No Help 2=With Help 3=Unable to Do	—	<b>BATHING</b> 0=Independent 1=Supervised 2=Minimal Assistance (Most by Self) 3=Moderate Assistance (Most by Staff) 4=Maximum Assistance
<b>DRESSING</b> 1=No Help 2=With Help 3=Unable to Do	—	<b>DRESSING/GROOMING</b> 0=Independent 1=Supervised 2=Minimal Assistance 3=Moderate Assistance 4=Maximum Assistance
<b>GROOMING</b> 1=No Help 2=With Help 3=Unable to Do	—	(SEE DRESSING/GROOMING)
<b>FEEDING</b> 1=No Help 2=With Help 3=Unable to Do	<b>EATING</b> 1=Feeds Self 2=Intermittent Supervision/ Assistance 3=Requires Continual Help 4=Totally Fed by Hand 5=Tube/Parenteral Feeding	<b>EATING</b> 0=Independent 1=Supervised 2=Minimal Assistance 3=Moderate Assistance 4=Maximum Assistance
<b>TRANSFER</b> 1=No Help 2=With Help 3=Unable to Do	<b>TRANSFER</b> 1=No Supervision/ Assistance 2=Intermittent Supervision/ Assistance 3=Requires Help - One Person 4=Requires Help - Two People 5=Cannot & Is Not Out of Bed	<b>TRANSFERRING</b> 0=Independent 1=Supervised 2=Minimal Assistance 3=Moderate Assistance 4=Maximum Assistance

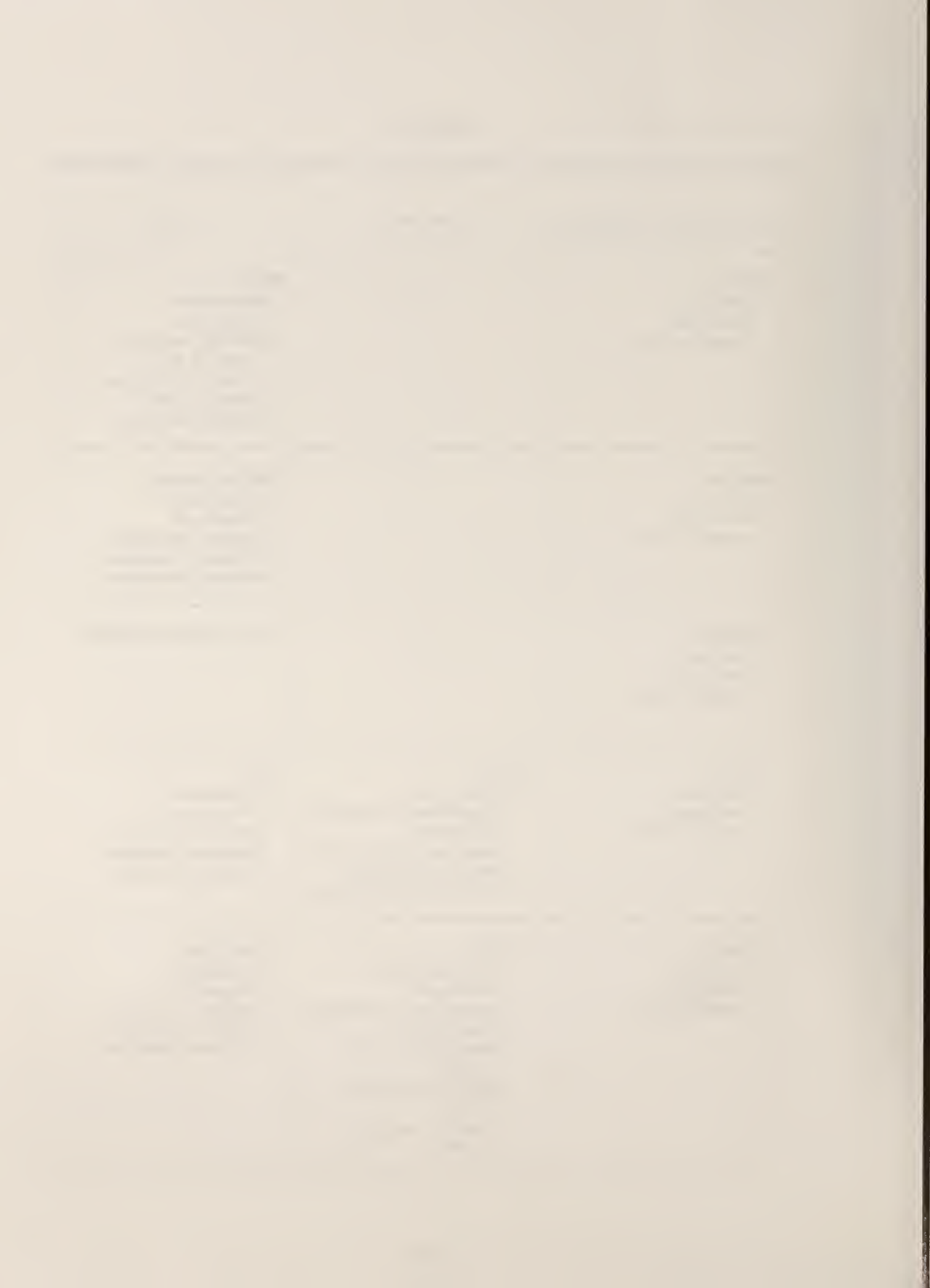




Figure 7.1 (cont'd)

Comparison of functional variables in the National Health Corporation, New York, and Texas data

National Health Corporation	New York	Texas
<b>WALKING/WHEELING</b> 1=Walks (may use equipment without help) 2=Walks With Help 3=Wheels Self 4=Is Wheeled 5=Bed/Chair Confined 6=Bed Confined	<b>MOBILITY</b> 1=No Supervision (may use walker, NOT wheelchair) 2=Intermittent Supervision/ Assistance 3=Constant Supervision/ Assistance 4=Wheels Without Supervision/Assistance 5=Is Wheeled, Chairfast, or Bedfast	<b>MOBILITY/AMBULATION</b> 0=Independent 1=Supervised 2=Minimal Assistance 3=Moderate Assistance 4=Maximum Assistance
<b>TOILETING</b> 1=No Help 2=With Help 3=Unable to Do	<b>TOILETING</b> 1=No Supervision, Assistance 2=Intermittent Supervision/ Minor Assistance 3=Continent, Requires Constant Supervision/ Assistance 4=Incontinent, Not Taken to Bathroom 5=Incontinent, Taken to Bathroom	<b>TOILETING</b> 0=Independent 1=Supervised 2=Minimal Assistance 3=Moderate Assistance 4=Maximum Assistance
<b>BLADDER FUNCTIONING</b> 1=Continent 2=Occasionally Incontinent 3=Incontinent 4=Catheter (Indwelling) 5=Catheter (External) 6=Ostomy  <b>BOWEL FUNCTIONING</b> 1=Continent 2=Occasionally Incontinent 3=Incontinent 4=Ostomy	(SEE TOILETING)	<b>INCONTINENCE</b> 0=None 1=Assistance required Control 2=Urinary Incontinence (NOTE: Catheter is NOT Incontinence) 3=Fecal Incontinence 4=Fecal and Urinary Incontinence



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## CHAPTER 8

### COMPARISON OF RESULTS

In the previous chapters estimates of prevalence, recovery and incidence rates have been presented for a number of quality indicators (including functional change measures) using three data sets. In addition the association of a number of clinical and demographic variables with these outcomes were tested for significance. The purpose of this chapter is to compare the results across the three data sets, comparing the outcome estimates as well as the significant relationships.

There are strong reservations concerning the comparability of measures due to definitional and data collection differences, data quality questions, as well as population differences. However, if consistent relationships are found across all data sets, this would provide some confidence that there are robust relationships that transcend the population, definitional, and data quality differences. With respect to outcome estimates, this type of comparison provides a range of estimates and describes the sensitivity of measures to data differences and population differences. Knowledge of the the range of estimates that these data provide, plus an understanding of how each measure was developed provides a useful foundation for determining the appropriate use of these numbers for quality assurance or quality regulation.

#### Populations

Table 8-1 presents a brief comparison of the demographic and functional characteristics of the three populations. The New York nursing home population was the oldest, followed by Texas and then NHC, with 26 percent 90 years of age or over compared with 20 percent for Texas and 16 percent for NHC. The New York and NHC populations have similar distributions of functional abilities, whereas the Texas population is appears to be much less dysfunctional. The Texas distribution, however, may be an underestimate of the true distribution based on concern that ADL changes are not sufficiently updated. The mental dysfunction comparison is difficult and the data may be suspect. A very high proportion of confused/disoriented residents in Texas compared with the other data is not consistent with the low physical dysfunction distribution. No measure of mental function was available in the New York data. The proportion female is consistent with the age distributions in the respective data sets.

#### Discharge Status

When comparing outcomes across data sets there is concern that differential attrition could affect the meaningfulness of the comparisons. The limitations in the data allow a comparison of total discharge rates in the three data sets and a detailed comparison of Texas and NHC by discharge status. The total discharge rate is highest in Texas, followed by NHC and New York (44 percent, 35 percent and 20 percent respectively) (See Table 8-2). The higher discharge rate for NHC population is expected, because it was more Medicare-oriented and would have a population that would be discharged home at a higher rate than the New York population or the Texas population, which includes only Medicaid residents.

THE  
HISTORY OF THE  
CITY OF BOSTON

The first settlement in Boston was made in 1630 by a group of Puritan settlers from England. They came to the city in search of religious freedom and a place to practice their faith. The settlers established a colony on the eastern shore of Boston Harbor, and the city grew rapidly. By 1639, the population of Boston had reached approximately 1,000 people.

In 1688, the city of Boston was incorporated as a municipality. This was the first time that the city had a formal government. The city council was established, and the mayor was elected. The city's growth continued, and by 1700, the population had reached approximately 2,000 people. The city's economy was based on trade and commerce, and it became a major center of commerce in the New England region.

In 1773, the city of Boston was the site of the Boston Tea Party, a protest against British taxation. The protesters dumped tea into the harbor, and the British government responded by closing the harbor and imposing martial law. This led to the American Revolution, and the city became a major center of the revolutionary movement. The city's population grew rapidly, and by 1800, it had reached approximately 10,000 people.

In 1822, the city of Boston was the site of the Faneuil Hall market, a major center of commerce. The market was established by the city government, and it became a major center of commerce in the city. The market was destroyed by fire in 1835, but it was rebuilt and continued to be a major center of commerce. The city's population continued to grow, and by 1850, it had reached approximately 25,000 people.



The most dramatic finding is the very high discharge rate to hospital for the Texas population. Although the way the Texas data set was constructed (not including any persons discharged who return to the same nursing home) may result in a slightly higher discharge to hospital rate than either of the other data sets, the large discrepancy indicates that nursing homes are being used differently in Texas than in other States. One may speculate that because of the low reimbursement rates in Texas residents that become very dysfunctional or difficult to care for are discharged to hospital. This is consistent with a nursing home population that is more functional than the other samples as was found.

### Functional change

Comparison of functional change measures were made for New York and NHC for the following functions: continence, transferring (bed to chair), mobility (walking and wheeling), feeding, and bedfast. The Texas data on functional change was not included in this analysis because it was felt that it was not of sufficient quality. There was discussion with representatives from Texas which cast doubt on the sufficiency of auditing done on these functional measures. (This is discussed more fully in Chapter 6.) Toileting and incontinence were not analyzed in New York because of the concern that the manner in which continence and toileting were combined did not allow for independent measurement of each function. The sample included residents who remained in the nursing home over the six month period. Table 8-3 compares the over-all proportions of persons transitioning from independence to assistance and assistance to independence. For continence and bedfast the concern was whether the status had changed (i.e., bedfast at Time 1 and not bedfast at Time 2).

In general, over six months in the nursing home about one fifth of residents who are independent in a function need assistance, whereas few (less than 10 percent) of those who were dependent gain independence. In two areas of functioning, mobility and feeding, improvement rates were higher.

There were some important differences between NHC and New York with respect to functional change. In general residents in the New York sample were more likely to decline and less likely to improve.

Over-all the estimates in both data sets are quite close, with the largest discrepancies being the bedfast variable with 59 percent no longer bedfast in New York compared with 34 percent in NHC.

### Stratified analyses

In both data sets analysis of functional change for eating, transferring, mobility, and bedfast were stratified by demographic and clinical variables. The major differences in the stratification variables was that New York included only primary diagnosis whereas NHC had up to nine diagnoses (one primary and up to eight secondary); disoriented was available only in NHC data. Few relationships were consistently found in both data sets. In the presentation that follows all relationships that met the  $p=.10$  criteria are discussed, but Table 8-4 includes only relationships that met the more stringent  $p<.001$  criteria. Readers interested in all the relationships should consult Chapter 5 for results from New York and Chapter 4 for NHC results.

With respect to bedfast, in New York only being older was significantly





related ( $p=.07$ ) to no longer being bedfast for those who had been bedfast. In the NHC data no significant variables were found. In the NHC population, those confused/disoriented were more likely to have a new incidence of bedfast ( $p<.0001$ ).

With respect to new dependence in mobility, residents aged under 65 years were less likely to become dependent ( $p=.0001$ , New York;  $p=.09$ , NHC). In the New York data, those with a stroke ( $p<.0001$ ) or having a clinically complex condition ( $p=.0001$ ) were less likely to become dependent. These variables were not significant in the NHC data. In the NHC data those confused or disoriented were more likely to become dependent ( $p=.08$ ). In the NHC data residents with a diagnosis of hip fracture ( $p<.0001$ ) or a clinically complex condition ( $p=.03$ ) were more likely to recover to independence, and those confused or disoriented ( $p<.0001$ ) were less likely to recover to independence.

With respect to feeding, older residents were more likely to become dependent in feeding ( $p<.0001$ , New York;  $p=.07$ , NHC). Those 65-89 years of age in the NHC sample were most likely to recover to independence ( $p=.01$ ). In the New York sample, the clinically complex group were less likely to become dependent ( $p=.001$ ), but was more likely in the NHC population ( $p=.07$ ). In the New York sample those with a diagnosis of stroke were less likely to become dependent in feeding ( $p=.005$ ). In NHC those with diabetes were more likely to become dependent ( $p=.004$ ), those confused or disoriented were more likely to become dependent ( $p<.0001$ ) and less likely to recover to independence ( $p<.0001$ ).

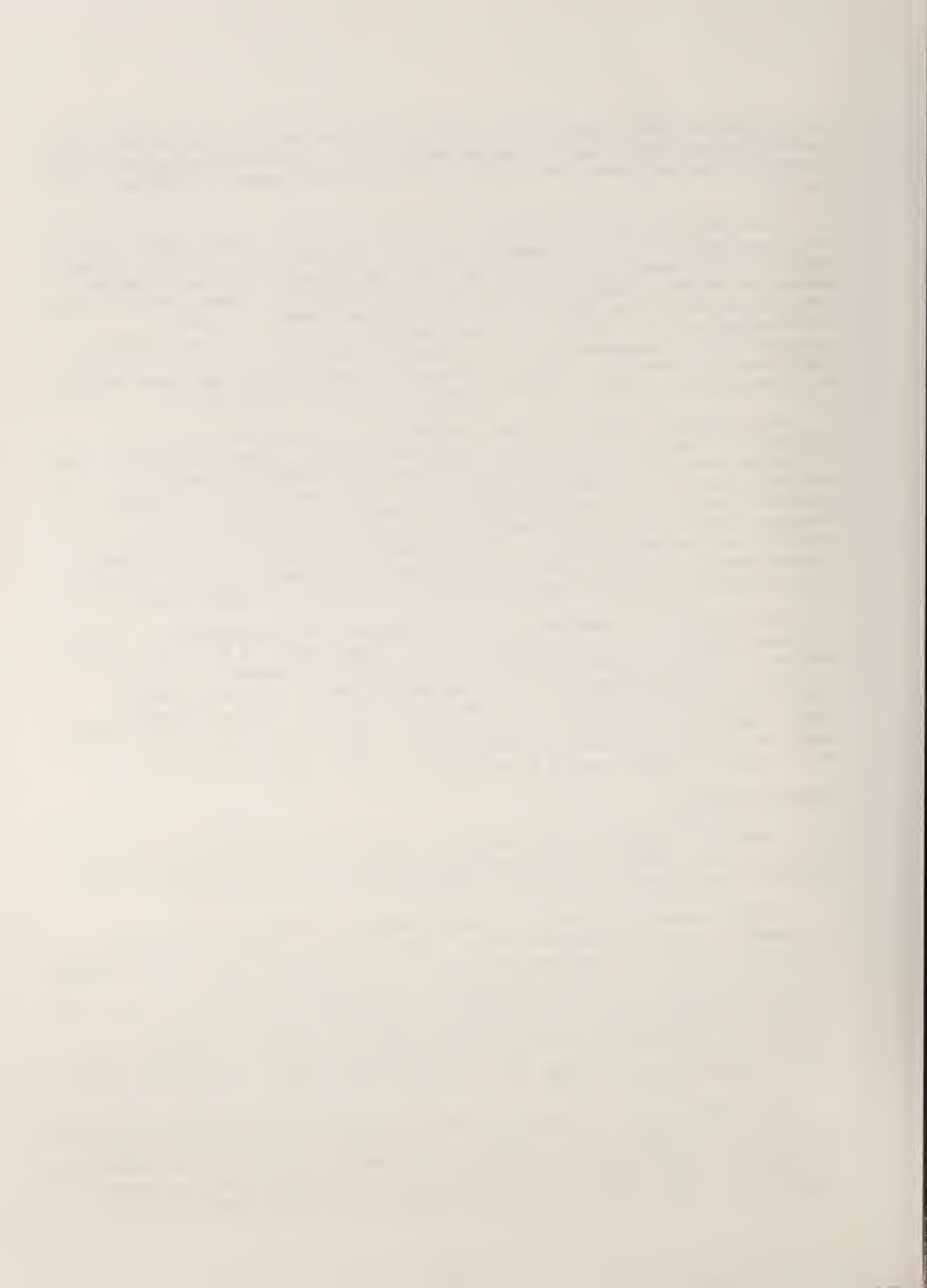
With respect to transferring, in both samples older residents ( $\geq$  or  $>65$ ) were more likely to become dependent ( $p=.10$  in NHC;  $p=.01$  in New York). In the New York population those with CHF were more likely to become independent ( $p<.0001$ ). In the NHC population those categorized as clinically complex ( $p=.02$ ) and those with CHF ( $p=.008$ ) were more likely to become dependent. Those diagnosed with stroke ( $p=.02$ ) and those confused or disoriented ( $p<.0001$ ) were less likely to recover to independence. Table 8-4 summarizes the significance findings using a significance level of .001.

#### Quality indicators

Table 8-5 summarizes the prevalence, recovery and incidence rate for the three data sets. The Texas data were included because Texas officials were confident that these measures were carefully monitored and updated.

Overall comparisons need to be made carefully because of definitional differences among the three data sets. With respect to contractures the range of estimates is overall unacceptably large. This indicates that very different criteria were used to define contractures. In the case of Texas, the definition includes reduction in range of motion due to paralysis. In New York the extremely high rates are disconcerting, but may reflect a strong orientation to physical therapy and a very sensitive monitoring of range of motion limitations. Clearly a more consistent definition of contracture needs to be established before these type of data can be useful.

In contrast to contractures, the decubitus ulcer estimates are quite close in the three data sets. The prevalence rates range from 10-16 percent; the recovery rates range from 38-51 percent; and the new incidence rates range from 3-10 percent. This reflects a state-of-the art in pressure sore measurement that is more sophisticated than in other areas with established scales for



number and stage of sore.

With respect to UTI, only two data sets included UTI as a diagnosis. The rates found in New York and in NHC are quite different, reflecting, most likely, differing definitions for what constitutes a UTI. The clinical literature is very vague on this subject. In order to use UTI as a quality indicator a very specific definition would need to be established and adhered to.

Similarly for bowel and bladder training, the numbers are not consistent. The New York definition was very stringent making it very difficult to qualify for bowel and bladder training under the definition. For purposes of a quality indicator, it appears that the definition should include most behavioral modification approaches including habit training. Consensus needs to be reached on an appropriate definition.

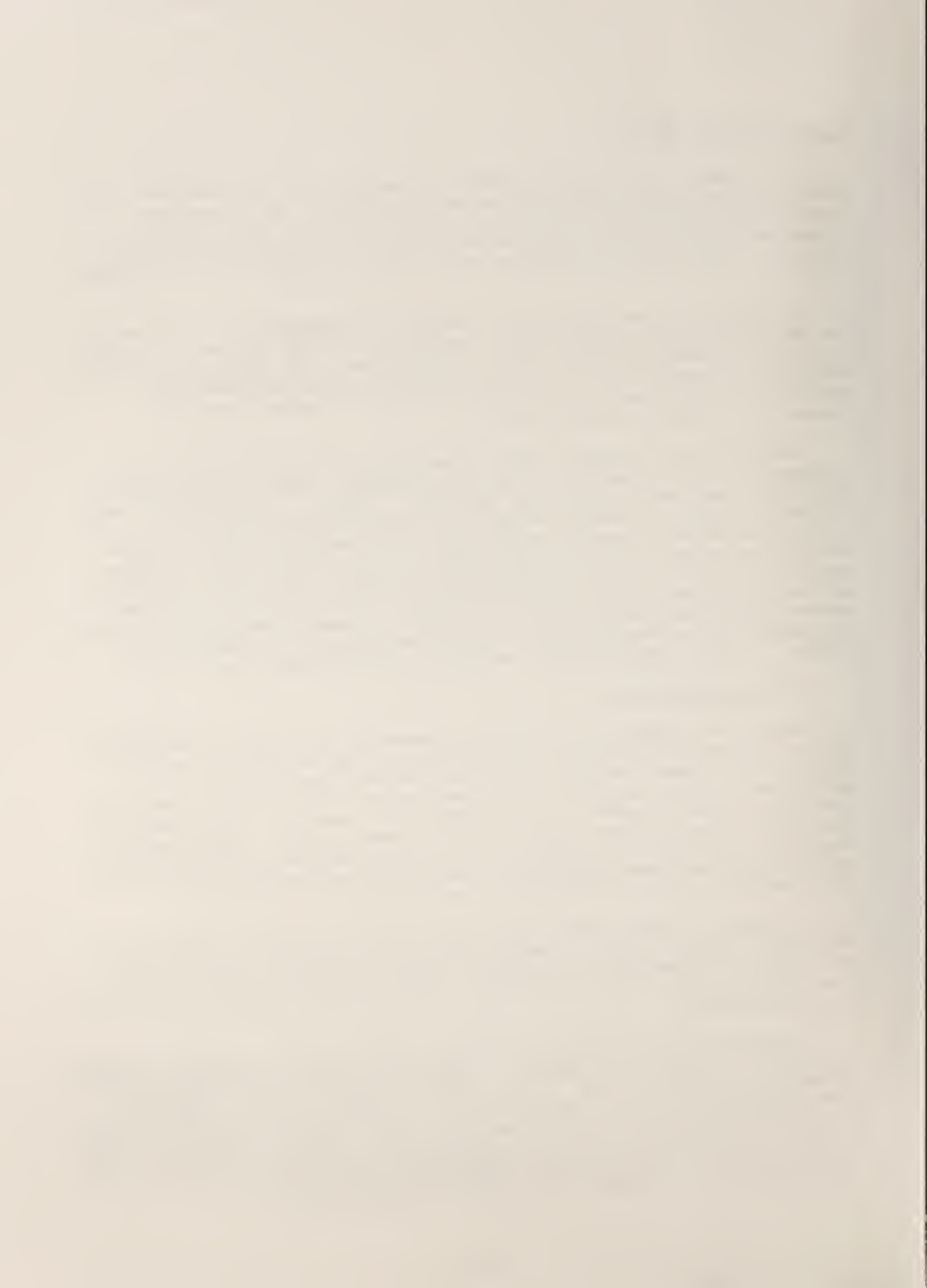
The restraints rates were quite close with respect to prevalence and new incidence in New York and NHC, but not for recovery. There was concern that definitions were not similar across data sets. Briefly, the concern was over the use of braces and bedrails as part of the definition of restraints and the distinction between ordered or administered. For example in Texas the data reflects orders and in the other data sets it reflects actual use. The high prevalence rates are a concern because they conflict with a goal of trying to achieve the highest level of mobility possible. Of course there is a need to preserve safety and need to prevent falls, but it appears that the pendulum may have swung too far toward safety. As with contractures, UTI, and bowel and bladder training, more consistent definitions must be established.

### Stratified analyses

Stratified analyses were done using demographic and clinical measures for the quality indicators with all three data sets. The analyses indicate that there are some common variables for all the outcomes but in general the significant variables are specific to the outcomes. Despite definitional and other differences, a number of relationships were consistent across the three data sets. Because of the large data sets a number of small differences were found with relatively low p-values. In order to highlight major differences relationships that were significant at the  $p < .001$  level and were evident in at least two data sets are reported below and presented in Table 8-6.

Residents who were more dysfunctional or confused were more likely to be restrained, and more likely to become restrained if they were not originally restrained. Residents with a catheter or more dysfunctional residents were more likely to have a UTI or get a UTI. Catheterization, however, was the more important variable.

More dysfunctional residents were more likely to have a decubitus ulcer or acquire one if they did not have one. Comatose residents and residents with a diagnosis of stroke were more likely to have a decubitus ulcer. Residents under 65 years of age, with more dysfunction, comatose, or with a diagnosis of stroke were more likely to have a decubitus ulcer. Those with more dysfunction or with a diagnosis of stroke were also more likely to get a new ulcer if they did not have one. Those with more dysfunction or those who were confused were more likely to be in a bowel and bladder training program.





## Discussion

After doing comparative analysis of the type presented in this chapter, it is always very sobering to feel the importance of consistent definitions for clinical and functional conditions and procedures. Despite differences across data sets, the importance of ADL information to adjust for the mix of residents was a common theme when comparing quality indicators. Diagnoses were less consistently important, but this reflected a need for better diagnostic categories and especially, a consistent use of a number of diagnoses and not a reliance on principal diagnosis. When comparing functional change, mental status (confused or disoriented) was consistently an important adjuster. Age was sometimes important but typically the distinction was between being over or under 65 years of age. Finally, and not surprisingly, if UTI is used as a quality indicator the expected number of UTI cases should be adjusted for catheter use unless the appropriateness of a large number of catheterizations is being questioned.



TABLE I		TABLE II	
Year	Population	Year	Population
1900	1,000,000	1910	1,500,000
1910	1,500,000	1920	2,000,000
1920	2,000,000	1930	2,500,000
1930	2,500,000	1940	3,000,000
1940	3,000,000	1950	3,500,000
1950	3,500,000	1960	4,000,000
1960	4,000,000	1970	4,500,000
1970	4,500,000	1980	5,000,000
1980	5,000,000	1990	5,500,000
1990	5,500,000	2000	6,000,000
2000	6,000,000	2010	6,500,000
2010	6,500,000	2020	7,000,000
2020	7,000,000	2030	7,500,000
2030	7,500,000	2040	8,000,000
2040	8,000,000	2050	8,500,000
2050	8,500,000	2060	9,000,000
2060	9,000,000	2070	9,500,000
2070	9,500,000	2080	10,000,000
2080	10,000,000	2090	10,500,000
2090	10,500,000	2100	11,000,000

Table 8-1

Profile of residents by data set (percent), National Health Corporation (NHC),  
New York and Texas

	<u>NHC</u>	<u>New York</u>	<u>Texas</u>
Age			
<65	10	5	11
65 - 89	74	69	69
90+	16	26	20
ADL			
Independent	21	19	41
Intermediate	36	39	26
Dependent	43	42	33
Confused/Disoriented	32	--	64
Female	70	78	73



Table 8-2

Six month discharge rates by data set (percent), National Health Corporation  
(NHC), New York and Texas

	<u>NHC</u>	<u>New York</u>	<u>Texas</u>
Total	35	20	44
Died	11	--	6
Hospital	9	--	29
Home	10	--	3
Other	5	--	6

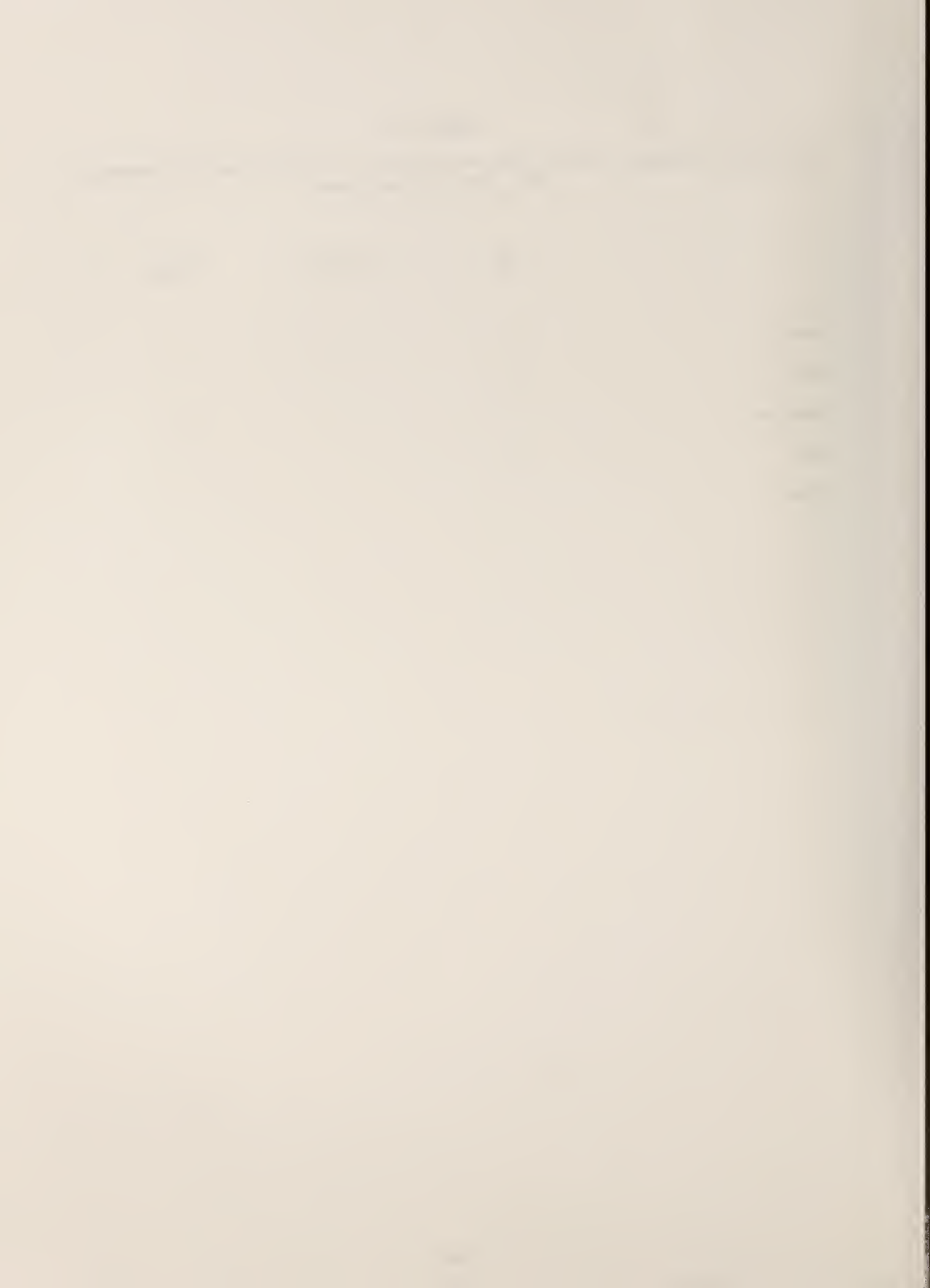




Table 8-3

Changes in functional status over six months for residents remaining in facility by data set (percent), National Health Corporation (NHC) and New York

	<u>NHC</u>	<u>New York</u>
Toileting		
Independent to Assist	32	--
Assist to Independent	5	--
Continence		
	<u>Bladder</u>	<u>Bowel</u>
Yes to No	17	16
No to Yes	8	9
Transfer		
Independent to Assist	16	25
Assist to Independent	8	4
Mobility (Walking and Wheeling)		
Independent to Assist	18	25
Assist to Independent	16	9
Feeding		
Independent to Assist	14	15
Assist to Independent	15	11
Bedfast		
No to Yes	3	1
Yes to No	34	59



Table 8-4

Significant adjusters for functional change by data set, New York and National Health Corporation (NHC)

	<u>Independent -&gt; Dependent</u>	<u>Dependent -&gt; Independent</u>
	<u>New York</u>	<u>NHC</u>
Feeding:		
Age (+)		
	Confused (+)	Confused (+)
Clinically Complex (-)		
Transferring:		
	CHF (+)	Confused (+)
Mobility:		
Age (+)		
		Hip Fracture (+)
Stroke/Plegia (-)		
		Confused (-)
Clinically Complex (-)		
Bedfast:	(Yes to No)	(No to Yes)
		Confused (+)

Note:

(+) indicated that the outcome is positively related to the case-mix adjuster.  
 (-) indicates that the outcome is negatively related to the case-mix adjuster.  
 Significance was determined at  $p < .001$ .



Table 8-5

Six month prevalence (P), recovery (R) and incidence (I) rates for certain conditions, National Health Corporation (NHC), New York and Texas

<u>Condition</u>	<u>NHC</u>			<u>New York</u>			<u>Texas</u>		
	<u>P</u>	<u>R</u>	<u>I</u>	<u>P</u>	<u>R</u>	<u>I</u>	<u>P</u>	<u>R</u>	<u>I</u>
Contractures	3	12	2	31	12	15	20	3	5
Decubitus Ulcers	16	46	6	15	51	10	10	38	3
UTI	8	17	2	13	30	9	--	--	--
Bladder and Bowel Training	14	50	5	2	99	0.2	4	31	0.4
Restraints (safety)	47	15	16	57	7	23	13	6	4
(control)	10	47	5						



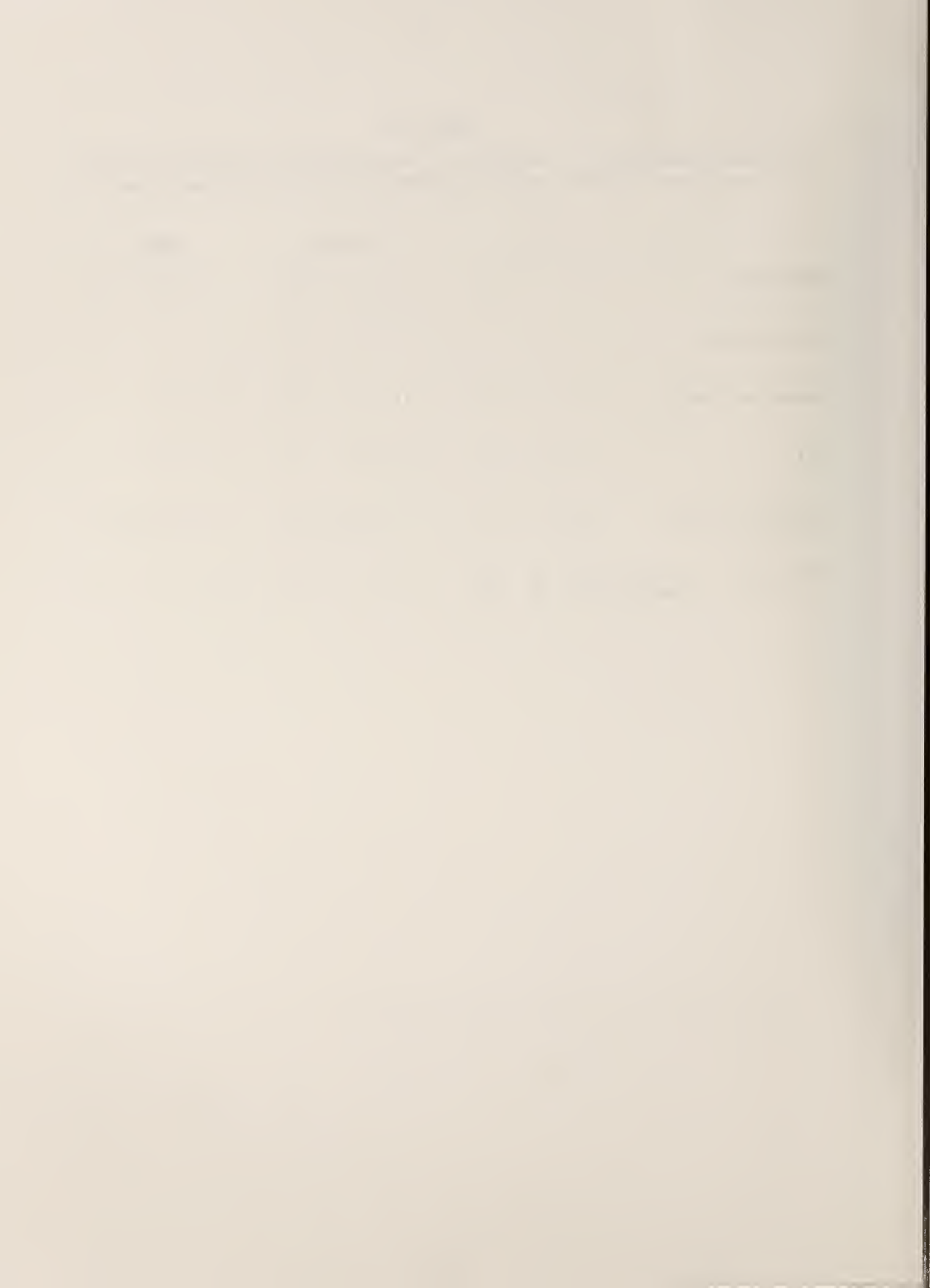


Table 8-6

Significant adjusters for quality indicators by data set, National Health  
Corporation (NHC), New York and Texas

<u>Indicator</u>	<u>NHC</u>	<u>New York</u>	<u>Texas</u>
	<u>Safety</u>	<u>Control</u>	
Restraints			
	<90 (P-)	<65 (P-)	
	ADL (P+)	ADL +	ADL (P+,I+)
	Confused +	Confused +	Confused (P+,I+)
UTI	Catheter (P+,I+)	Catheter +	N/A
	ADL (P+,I+)	ADL (P+,I+)	
		Diabetes (P+)	
Decubitus	ADL (P+,I+)	ADL +	ADL (P+,I+)
Ulcer	Comatose (P+,R-)	Comatose (P+)	Comatose (P+)
	Clin complex (P-)	Clin complex (P+)	
	Stroke (P+)		Stroke (P+)
	Diabetes (P+)		
Contracture	<65 (P+)	<65 (P+)	<65 (P+)
	ADL (P+,I+)	ADL +	ADL (P+,I+)
		Hip (P-)	
		Comatose (P+)	Comatose (P+)
		Clin complex (P+)	
	Stroke (P+)	Stroke (P+,I+)	Stroke (P+,I+)
		CHF (P-)	
Bowel/Bladder	ADL (P+,I+)		ADL (P+)
Training	Confused (P+,I+)		Confused (P+)
			Hip Fracture (P+)

Notes:

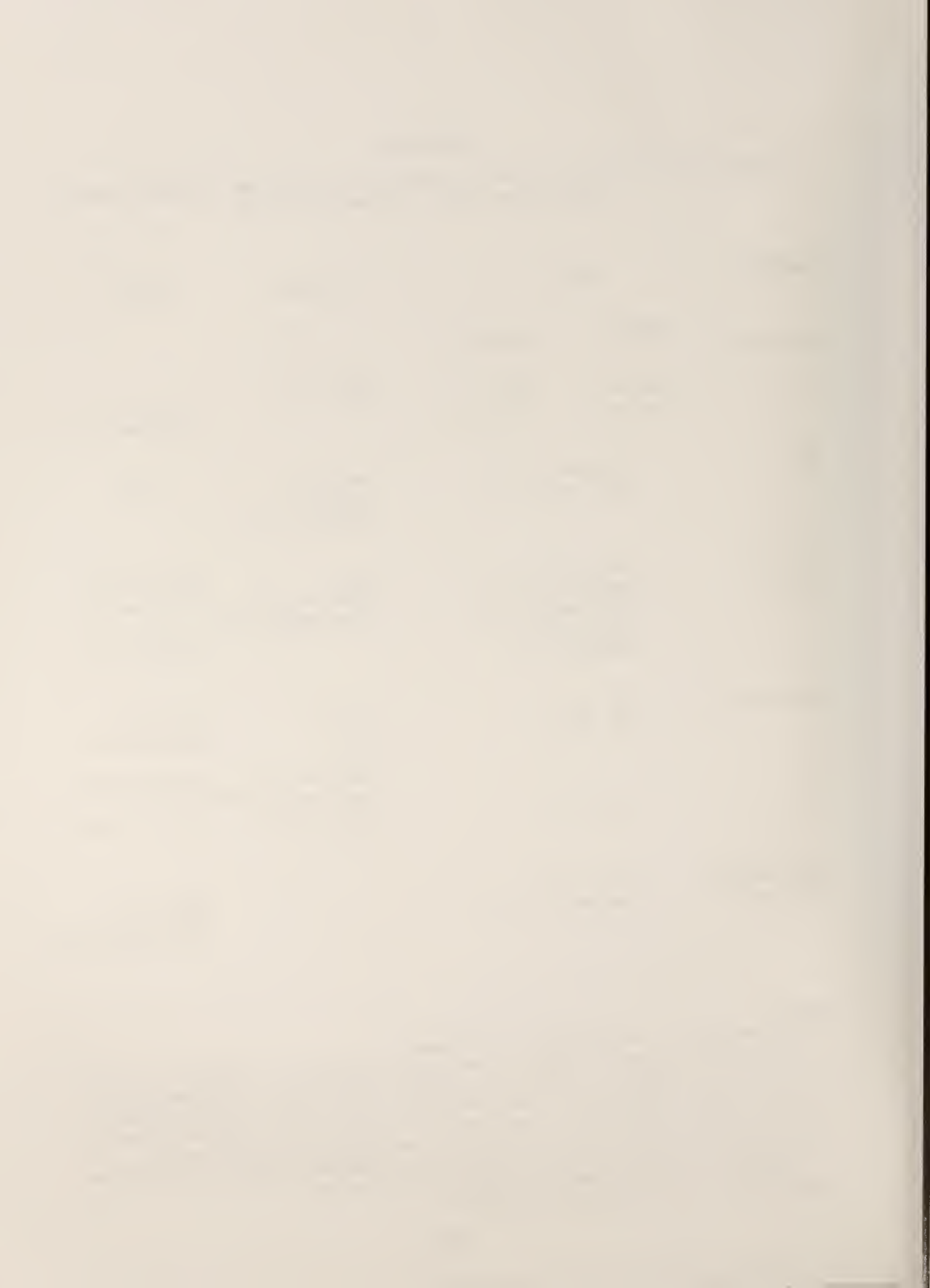
P = Prevalence, I = Incidence, R = Recovery

P+, I+, or R+ indicates that the prevalence, incidence or recovery rate of the quality indicator is positively correlated to the case-mix adjuster.

P-, I-, or R- indicates that the prevalence, incidence or recovery rate of the quality indicator is negatively correlated to the case-mix adjuster.

A "+" indicates that both the prevalence and incidence of the quality indicator are positively correlated to the case-mix adjuster and that the recovery or discontinuance is negatively correlated.

Significance was determined at P<.001



## CHAPTER 2

### VALIDATION OF RHODE ISLAND MODELS WITH DATA FROM NEW YORK AND THE NATIONAL HEALTH CORPORATION

#### The Rhode Island Models

As a final phase of this project, data from New York and the National Health Corporation were used to validate three statistical models developed using data from Rhode Island. The Rhode Island models predict death, functional decline and functional improvement of nursing home residents. The main purpose of this validation was to test the extent to which the models would work when applied to nursing home populations other than the population used to develop the models. A second goal of these analyses was to explore the feasibility of applying models developed using research quality data to administrative data collected using different assessment instruments.

The Rhode Island models were developed as part of the project "Risk of Functional Change in Nursing Homes," Grant Number HS05625 from the National Center for Health Services Research and Health Care Technology. The grant was awarded to Brown University with William D. Spector serving as the Principal Investigator and Julius Pellegrino as the Federal Project Officer. The overall purpose of the project was to determine to what extent characteristics of both nursing home residents and nursing home facilities predict resident outcomes. Data used to develop the models were collected on 2,603 residents of 80 facilities in Rhode Island as part of a study of the effects of a new nursing home regulatory process on nursing home outcome (Spector et al., 1987).

Models predicting death, functional decline and functional improvement were developed from resident characteristics. In addition to models based on individual-level variables, models including both resident and facility characteristics (size, organizational type (profit vs. non-profit), staffing, staff turnover, facility financial resources and services provided) were also developed in the Rhode Island project. The validation analyses presented below use only data on resident characteristics from New York and the National Health Corporation because facility data were not available. Therefore, the comparison is limited to the Rhode Island models based solely on resident characteristics. Before presenting the methods and results of this validation process, a summary of the development of the original models is presented.

#### Methods

Assessment information was collected from all residents in the sample at an initial point in time. Follow-up data were gathered five to seven months later. Both waves of data collection took place between December 1984 and June 1986. The data collected initially were the basis for prediction of outcomes; the second measures were used for a determination of the actual outcome. Death certificates on file at the Rhode Island Department of Health were examined to determine whether those residents who had been discharged from the facility during the period between the two waves of data collection had subsequently died.

# THE HISTORY OF THE UNITED STATES

## CHAPTER I

The first settlers of the United States were the Indians, who lived in small tribes and hunted for food. They were followed by the Europeans, who came to the New World in search of wealth and adventure. The first European to set foot on the continent was Christopher Columbus in 1492. He was followed by other explorers, including John Cabot and Vasco da Gama. The first permanent European settlement was founded by the Spanish in 1565 at St. Augustine, Florida.

The British arrived in North America in 1607, establishing the first permanent English colony at Jamestown, Virginia. They were followed by other settlers, including the Pilgrims at Plymouth in 1620 and the Puritans at Boston in 1630. The British colonies grew in number and size, and they began to develop a sense of independence from the mother country. This led to the American Revolution, which began in 1775 and ended in 1783 with the signing of the Treaty of Paris.

The United States was founded on the principles of liberty and democracy. The first President, George Washington, was elected in 1789. The Constitution was adopted in 1787, and it has since served as the foundation of the nation's government. The United States has grown from a small colony to a great power, and it has played a leading role in the world's history. It has fought many wars, and it has been the center of many important events. The United States is a land of opportunity and hope, and it is a place where everyone can find a better life.

The United States is a country of many different people, and it is a place where everyone is free to live as they choose. It is a country of great diversity, and it is a place where everyone can find a home. The United States is a country of great strength and power, and it is a place where everyone can make a difference. The United States is a country of great hope and promise, and it is a place where everyone can build a better future.



## Independent variables

Information was gathered that measured correlates of resident vitality. Each of the assessments included a variety of measures of physical function (ADL level, presence of mental impairment or disruptive behavior); selected medical diagnoses; indicators of recent episodes of acute illness (length of stay in the nursing home for the current episode, receipt of skilled care services or rehabilitative therapies); age and sex.

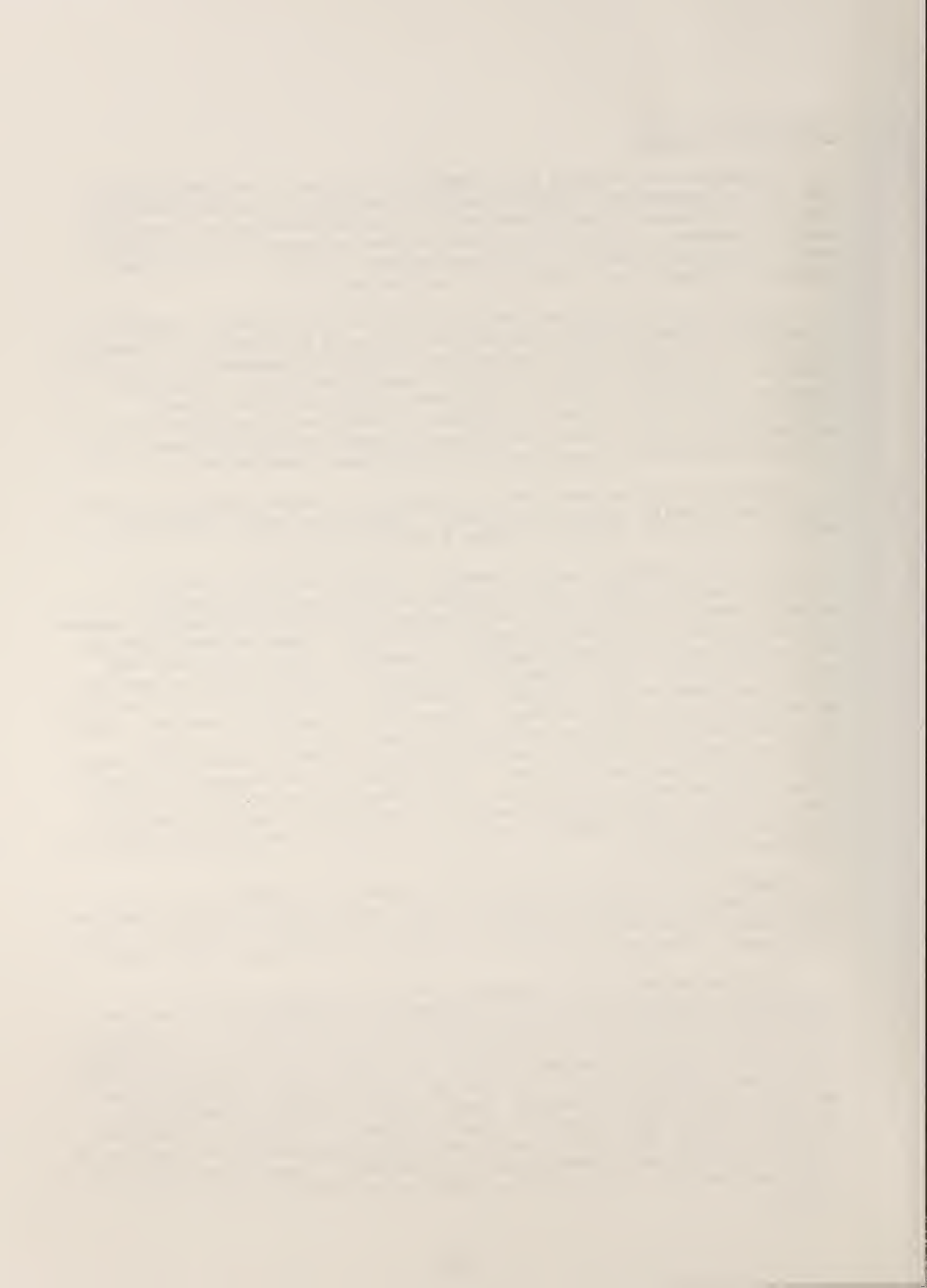
A mental status index was developed based on the resident's responses to 11 cognitive questions. Each response was evaluated by surveyors as correct, incorrect, or uncodable. For this analysis, uncodable responses were considered incorrect. The index was constructed by counting the number of incorrect responses. Therefore, scores on this index range from 0 (all correct responses) to 11 (all incorrect responses). These scores were classified into two categories for this study: severe mental impairment (index scores = 8 to 11) and no impairment to moderate mental impairment (index scores = 0 to 7).

Disruptive behavior was coded as present if a resident displayed at least one of the following behaviors: noisiness, physical or verbal abusiveness, wandering, disrobing oneself, or other disruptive behaviors.

Up to five diagnoses were gathered by research surveyors from each resident's medical record. If a resident had more than five diagnoses, the surveyor chose those which he or she considered to be the major medical reasons for the resident's institutionalization. The ICD-9 codes for each diagnosis were recoded to 49 aggregate diagnostic categories. These categories were mutually exclusive. Eight diagnostic categories were selected from these 49 categories, based on their clinical implications for physical function as well as their prevalence among residents. These eight diagnostic group are: organic brain syndrome, schizophrenia and mental retardation, affective mental disorders, chronic obstructive pulmonary diseases (COPD), cancer, hip fracture, stroke, and ischemic heart disease. The diagnosis of schizophrenia or mental retardation was used to capture the nursing home population who came to the home after being deinstitutionalized from a psychiatric facility. The ICD-9 codes for these eight diagnostic categories, as well as brief definitions, are presented in Table 9-1.

Length of stay (LOS) for the current episode was classified into two groups: a short-stay group (3 months or less) and a long stay group (more than three months). The initial three month period is thought to be that in which the resident experiences the greatest physical and functional fluctuation.

Variables related to the receipt of skilled care services and rehabilitative therapies were also introduced as individual-level baseline information. Skilled care services include injections, IV care, ostomy care, active skin care, tube care and catheter care. Residents who were receiving at least one of these services were assumed to be those with particularly acute medical needs, perhaps related to a recent hospitalization. Rehabilitative services involve physical therapy, range of motion exercise, respiratory therapy, occupational therapy, and speech therapy. A resident was coded as receiving skilled care services or rehabilitative therapies if at least one of the services from among these groups was provided. If none of the services in a group was provided, the resident was coded as not receiving that type of service.



### Death

For each resident in the sample, a dichotomous (yes/no) death variable was included. This variable indicated whether a resident had died within the 5 to 7 month follow-up period. Because deaths were determined from both nursing home records and death certificates, residents who were discharged from the nursing home and died within the follow-up period were considered dead in the Rhode Island model.

### Functional change: Improvement and decline

For residents who were still in the facility at the time of the second assessment, the scores on the ADL scale at the two points in time were compared to determine whether a change in functional status had occurred. This ADL scale was a combination of six functional measures: bathing, dressing, toileting, transferring, feeding, and continence. The scale was the following:

- 0= independent in all six activities
- 1= independent in all but one activity
- 2= dependent in bathing and one other activity
- 3= dependent in bathing, dressing and one other activity
- 4= dependent in bathing, dressing, toileting, and one other activity
- 5= dependent in bathing, dressing, toileting, transferring, and one other activity
- 6= dependent in all six activities
- 7= other.

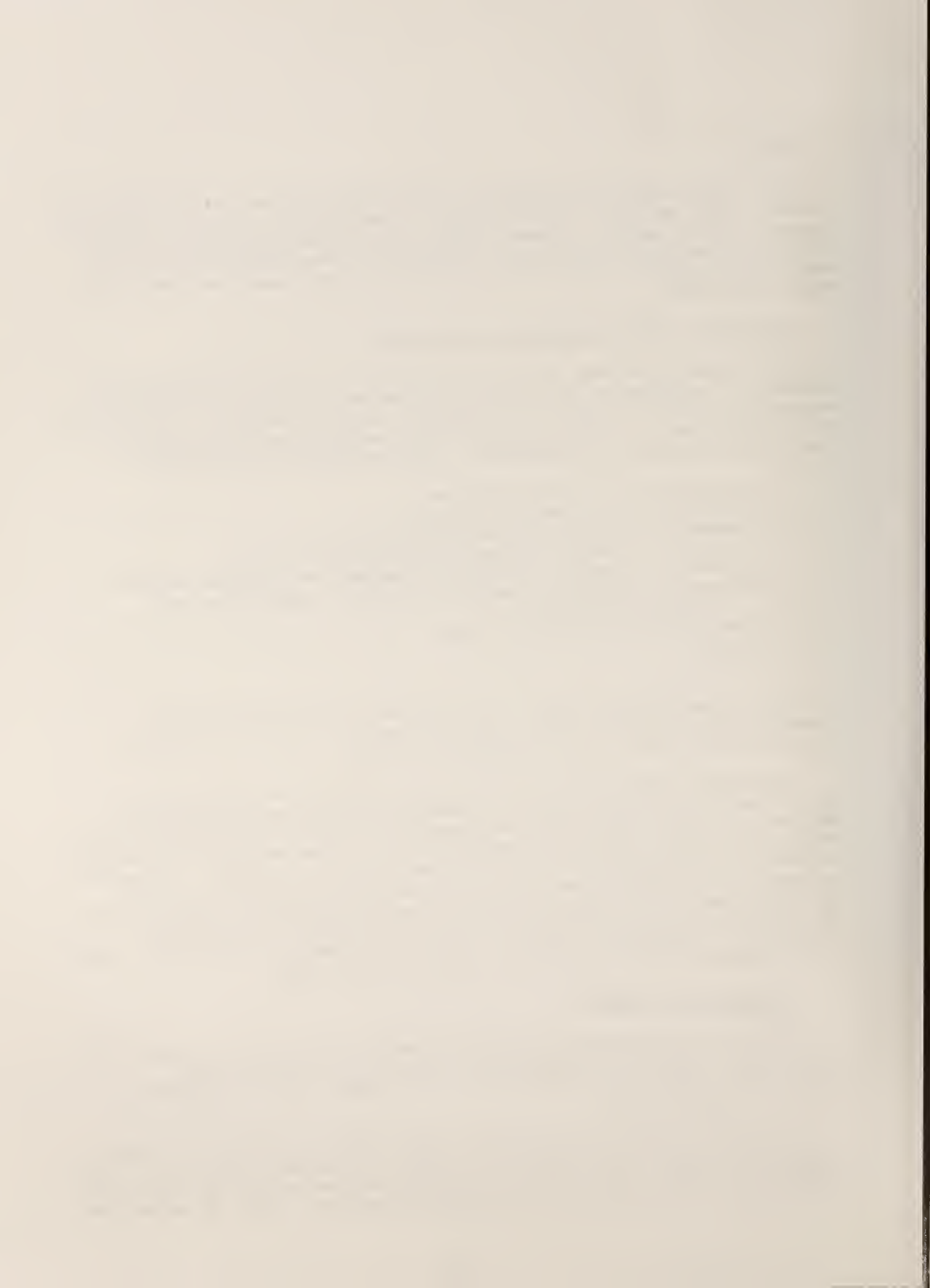
Those classified as "other", either at the first or the follow-up assessment, were excluded from the analyses because it was not possible to determine definitively their improvement or decline.

Improvement was defined as a reduction in dysfunction which resulted in the resident's inclusion in an ADL category indicating fewer dependencies. Decline, conversely, was defined as a resident's movement into an ADL category indicating a greater number of dependencies. Only those residents who were able to improve or decline were included in those respective analyses. For example, residents in the most dysfunctional ADL category at the time of the first assessment could not decline any further; these residents were excluded from the analysis of decline. Similarly, it was not possible for residents classified as independent (ADL=0) to improve with respect to functional status; these residents were excluded from analyses of improvement.

### Developing the models

Each of the independent variables was tested for inclusion in each of the three models. The three final models include those items which made statistically significant contributions to the models. Each of the final models is described below.

Multivariate models were developed using logistic regression procedures to predict each of the three outcomes of interest. Bivariate analyses were first conducted to examine the potential association between each of the variables hypothesized to be related to the outcomes of interest. Those variables found





to be significantly ( $p < .10$ ) related to the outcomes were included in logistic regression analyses. This procedure produced odds ratios (O.R.) for each item, indicating the relationship between that item and the outcome, relative to the effect of the reference group, and adjusted for all other terms in the model.

## Results

Just less than ten percent (9.9%) of the residents in the Rhode Island sample were dead by the time of the follow-up assessments. One-fifth (20.2%) of those eligible to improve did so; the proportion of those eligible to decline who did so was about twice as great (40.4%).

### Death

Eight constructs were significant in the multivariate analysis: sex, age, length of stay, 6-item ADL score, cancer, COPD, therapies, and skilled services. Females were 28 percent less likely to die than males (odds ratio (O.R.) = .72). Residents in the older age groups had higher likelihoods of death, with those in the 70-89 group being three times as likely (O.R. = 3.32) relative to those under 70, and those in the 90 years of age and over category almost five times as likely (O.R. = 4.79). Being in the nursing home for longer than three months decreased the likelihood of death by about 40 percent (O.R. = .61). Decreasing physical function increased the likelihood of death; residents having ADL scores of 3, 4, 5, or 8 were almost three times more likely to die (O.R. = 2.75) and those with an ADL score of 6 having a likelihood almost five times greater (O.R. = 4.80) than the reference group (those with scores of 0, 1, or 2). Residents with cancer or COPD were almost twice as likely to die (O.R. = 2.20 and 1.91 respectively) than those without these diagnoses. Residents receiving therapies or skilled services also had increased likelihoods of death in the 30 to 50 percent range (O.R. = 1.52 and 1.35 respectively) (See Table 9-2).

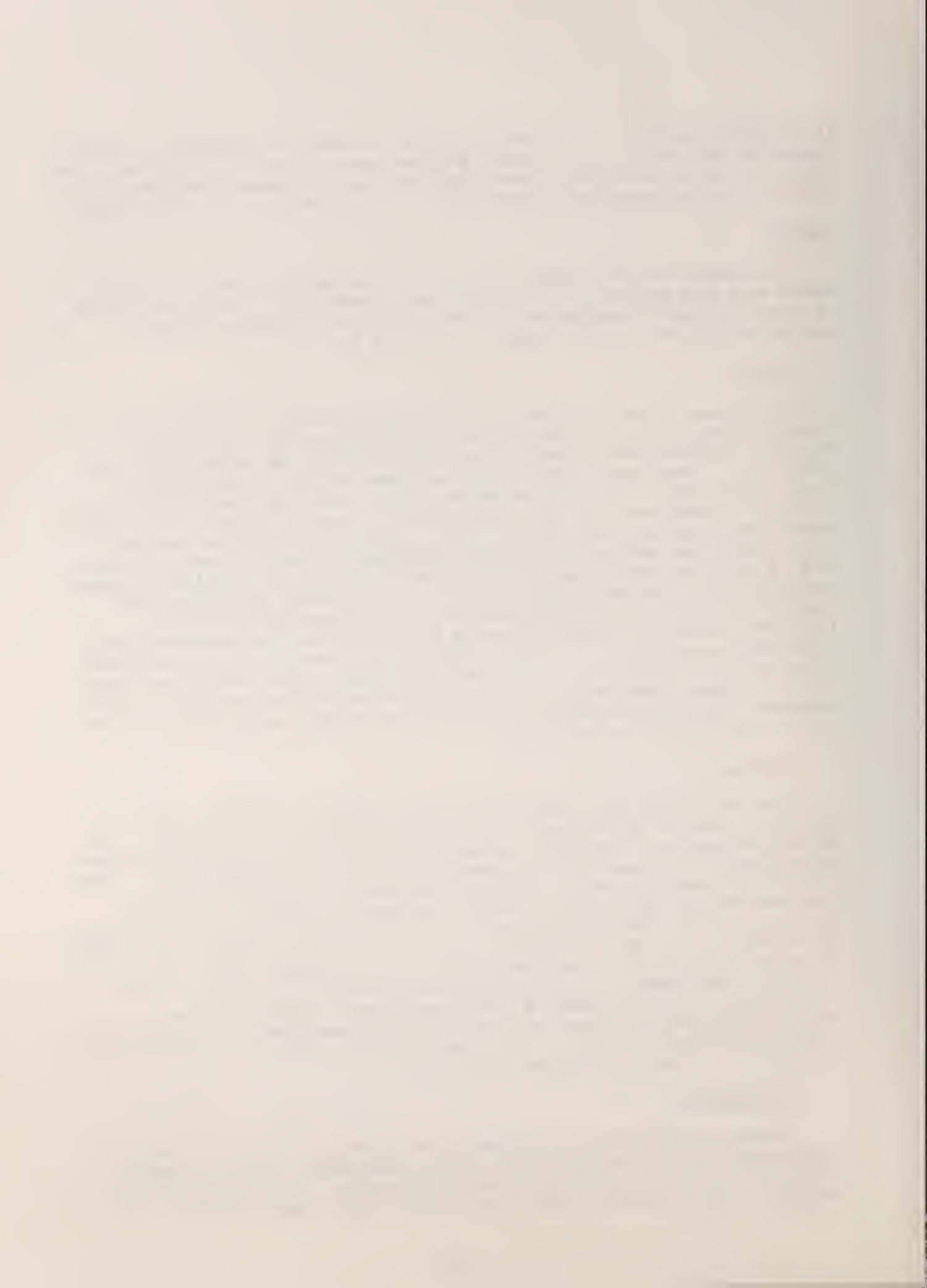
### Decline

Five constructs were significant in the analysis of decline: 6-item ADL, affective disorder, schizophrenia or mental retardation, brain disorder, and disruptive behavior. Residents' scores on the 6-item ADL scale were analyzed using those with a score of 0 (no dependencies) as the reference group. Those with an ADL score of 1 were 39 percent less likely to decline (O.R. = .61); residents with an ADL score of 2 were 57 percent less likely to decline (O.R. = .43), and those with a score of 3, 4, or 5 were 71 percent less likely to decline (O.R. = .29). Residents with affective mental disorder were about 35 percent less likely to decline (O.R. = .64) than those without this disorder. Schizophrenic or mentally retarded residents were half as likely (O.R. = .50) to decline compared with those without these conditions. Residents with brain syndrome and those who displayed disruptive behavior had a higher likelihood of decline, both being about 40 percent more likely (O.R. = 1.41 and 1.43 respectively) (See Table 9-3).

### Improvement

Seven constructs were significantly associated with the likelihood of improvement: age, 6-item ADL, severe mental impairment, affective disorder, receiving therapies, receiving skilled care services, and displaying disruptive behavior. Those residents aged under 70 years were almost 40 percent more





likely to improve than those who were aged 70 to 89 (O.R. = 1.39), while those 90 or over were less likely (relative to those 70 to 89) to improve (O.R. = .68). Using residents with ADL scores of 1, 4, 5, and 6 as the reference group, it was found that those with scores of 2 were almost 50 percent more likely to improve (O.R. = 1.51), while improvement was more than two and one half times as likely (O.R. = 2.62) among those with ADL scores of 3 when compared to the reference group. Severe mental impairment lessened the likelihood of improvement by 26 percent (O.R. = .74), while affective disorder increased the likelihood of improving by 76 (O.R. = 1.76). Receiving therapies or skilled care services lowered the likelihood of improvement by a similar amount (O.R. = .71 and .80 respectively). Residents who displayed disruptive behavior were about 32 percent less likely to improve (O.R. = .68) (See Table 9-4).

### Summary

The Rhode Island study developed models based on individual characteristics to predict resident outcomes of death, functional decline and functional improvement as quality of care indicators. The ADL functional measure was a significant predictor for all three outcomes. Among other resident characteristics, the variables indicating acute care episodes emerged as dominant predictors for death, followed by diagnoses of cancer and COPD and demographic characteristics. Physical functional decline, on the other hand, was mainly explained by functional measures and different mental disorders including schizophrenia, affective disorder, and brain syndrome. Improvement was related to all major resident traits: age, physical functioning, mental and psychological status, and recent acute episodes.

### Validation of the Rhode Island Models

The analytic files that were created from the New York and NHC data sets previously described in this report are similar to those used in the creation of the Rhode Island models. Each consists of two waves of assessments, approximately six months apart, from which initial resident characteristics and subsequent outcomes could be determined. There are, however, some differences among the data that affect the validation analyses.

### Differences between dependent variables

#### Death

Information about deaths was compiled somewhat differently in the collection of the Rhode Island data than in New York and NHC. In New York and NHC, those residents who were discharged dead from the facility were counted as deaths during the study period. In Rhode Island, in addition to counting deaths in the facility, death certificates on file at the state Department of Health were examined to determine whether any of those residents not in the facility at the time of the follow-up assessments had died during the study period. In Rhode Island, then, residents who were discharged alive but died within the 5-7 month study period were included as deaths during the study period; in NHC these deaths were not included, as they could not be identified. No death information was available in the New York data, so the death model was only validated with NHC data.



### Functional measurement

The quantity of information available about physical function varied across the three data sets. The abilities of the resulting activities of daily living scales to detect and measure improvement and decline varied accordingly. The Rhode Island and NHC data sets contained similar kinds of information about six functional items: continence, bathing, dressing, toileting, transferring, and eating. The New York data set contains information on eating, transferring, and toileting only. Consequently, the scales developed from the Rhode Island and NHC data can detect improvement or decline in more areas than the New York scale.

In addition, the improvement or decline that can be detected in New York is limited to the more dysfunctional end of the ADL hierarchy. For example, a resident who improves or declines in ability to bathe or dress will be identified in Rhode Island or NHC, but not in New York; bathing and dressing are, generally, the ADLs in which a resident is first likely to become dependent. Eating, transferring and toileting are lower on the hierarchical scale; decline or improvement in these items is likely only for more dependent residents. It is likely that this variation affects the amount and kind of functional change that is detected, and, consequently, the predictive ability of the models.

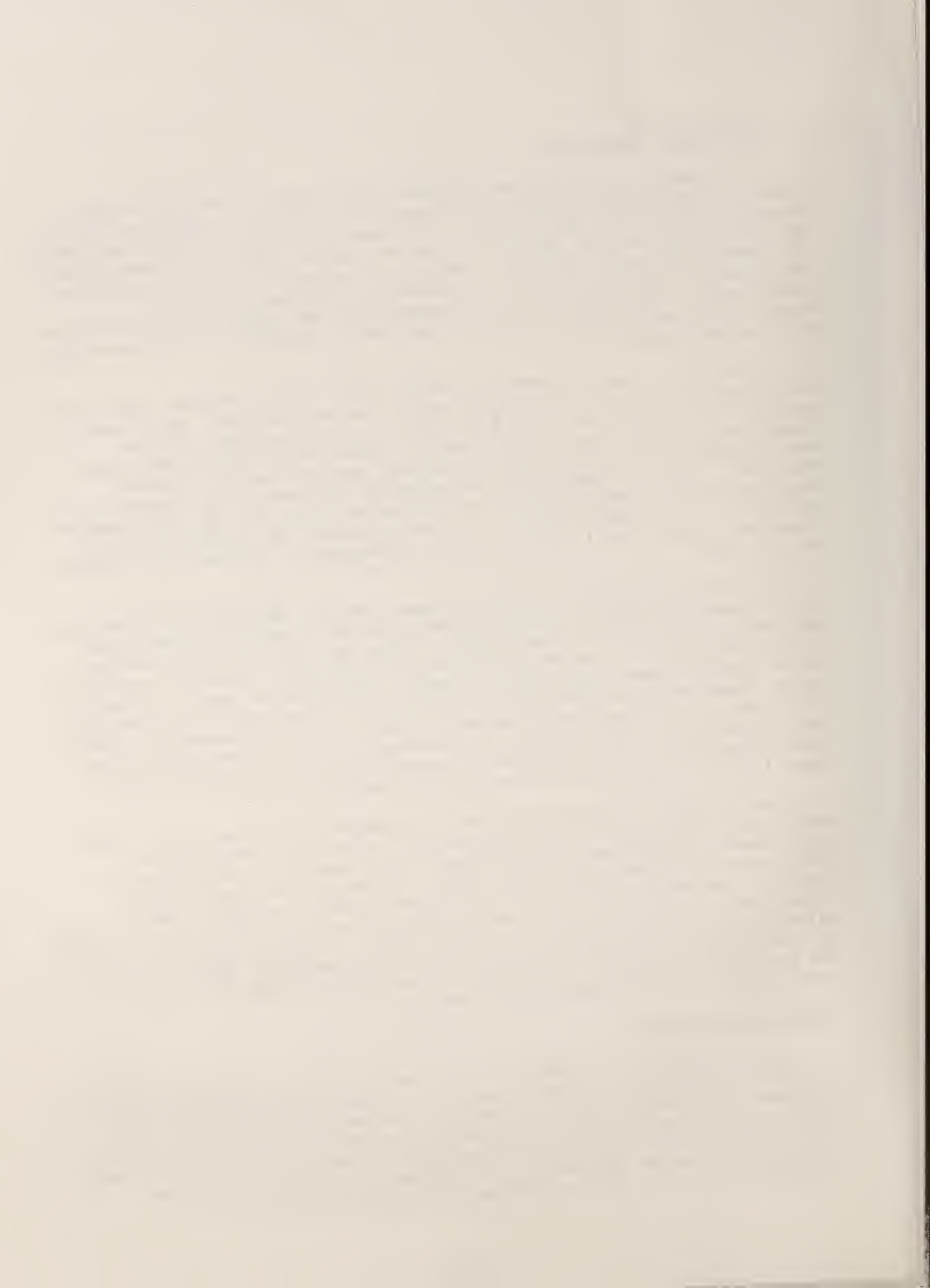
In both the New York and NHC data sets, the most dysfunctional group was split according to ability to feed, distinguishing between those who needed help feeding and those who were unable to feed. As a result of previous work with the NHC data, it was determined that, in addition to making it possible to detect movement among this group of residents, this was an important predictive split: those residents dependent in all six ADLs and were unable to feed were more likely to die than those similarly dependent but only needed help feeding. The information necessary to make this distinction was not available in the Rhode Island data, and, consequently, detection of improvement and decline among this most dysfunctional group was not possible.

The outcomes of interest occurred in different proportions in the three data sets. It is probable that some of this variation is the result of differences in measurement. In the Rhode Island data set, 40.4 percent of those eligible to decline did so; in NHC, 27.9 percent of those eligible declined. In New York, 43.5 percent of those eligible declined. Similar proportions of the Rhode Island and NHC samples improved: 20.2 percent of those eligible in Rhode Island and 19.1 percent in NHC. A greater proportion (31.4% of those eligible) improved in New York. Information about those who died in New York is not available; the proportions who died in Rhode Island and NHC were similar (9.9% and 10.6%, respectively).

### Matching the variables

The strategy for this analysis was to match variables across the data sets as closely as possible. A certain amount of variation was accepted, as the assessment instruments differed across the data sets. Some variables were created by recoding the existing information to develop items similar to those from the Rhode Island data set that were used in the creation of the original models. The variables included in the multivariate logistic regression procedures in the New York and NHC data sets are outlined below.







### New York Data

Two of the three models were tested using the New York data: those predicting decline and improvement. The New York data set does not contain information about deaths, so the third model could not be examined. The items included in these models are presented below.

#### Independent variables

The three age groups used in the original model (70 years of age or under; over 70 to 89; 90 or over) were retained.

The six-item ADL scale used in the Rhode Island analyses was modified due to the limited availability of ADL items in the New York data set. Information was available only for eating, transferring, and toileting; the ADL scale constructed from the Rhode Island data contained, in addition, information about bathing, dressing, and continence. Each of these ADL items was dichotomized such that a resident is assessed as independent or dependent in each activity. In addition, the eating scores were split to distinguish between those needing help in order to eat and those unable to eat. Residents scored as 3 (requires continual help) on the eating item were considered those who need help eating; those with scores of 4 or 5 (totally fed by hand and tube or parenteral feeding) were considered unable to eat.

The resulting ADL scale was the following:

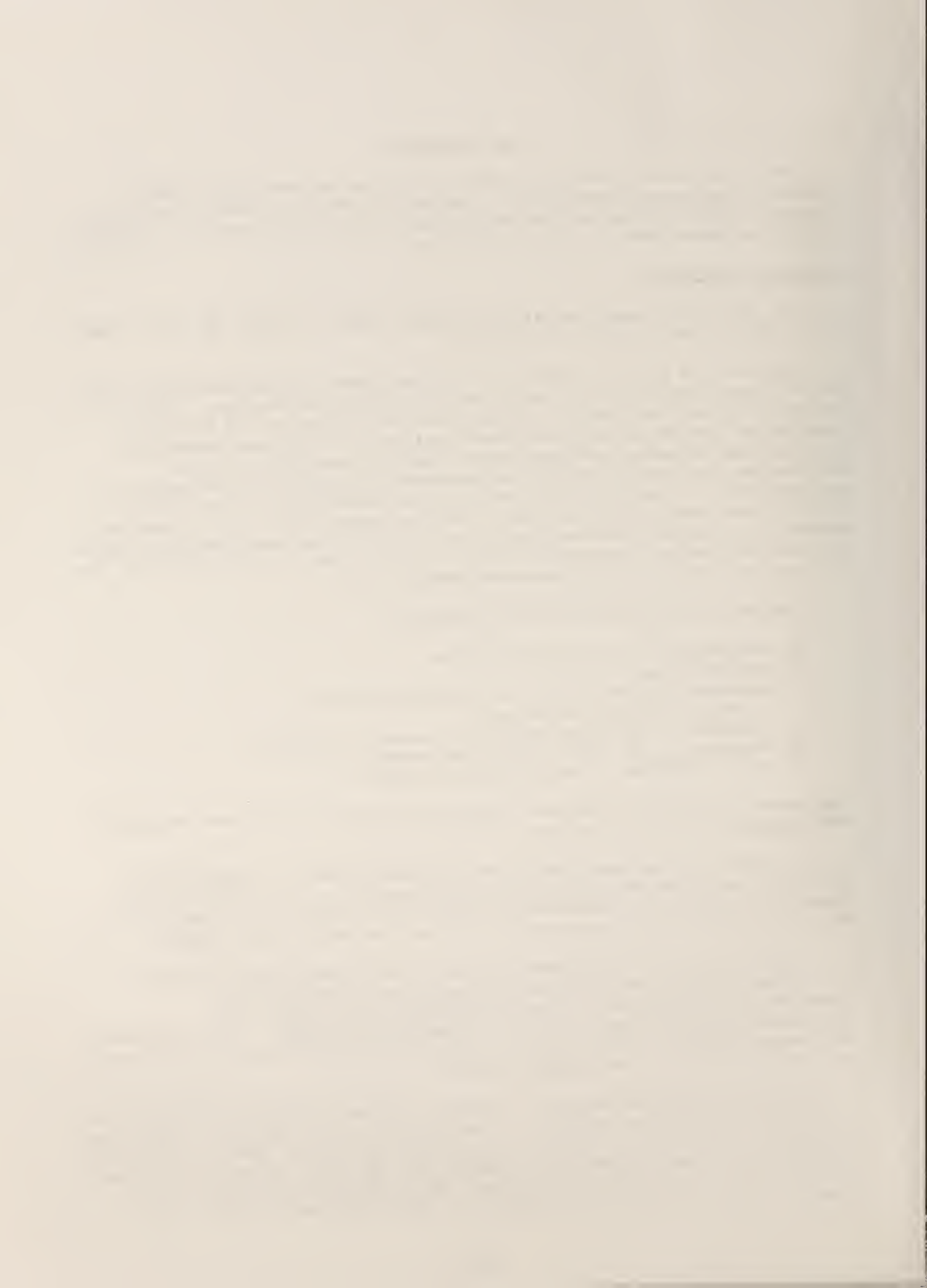
- 0= independent in all three activities
- 1= one dependency
- 2= dependent in transferring and one other activity  
(either eating or toileting)
- 3= dependent in all three activities/ needs help eating
- 4= dependent in all three activities/ unable to eat
- 7= other (dependent in eating and toileting).

Residents in the other category at either the initial or follow-up assessment were excluded from these analyses.

The severe mental impairment item, which was based on a mental status questionnaire in the original model, is not available in the New York data. There is no comparable information available about mental status that could be substituted. This item, consequently, was not included in these models.

There are up to five diagnoses listed on the Rhode Island assessment instrument, but only one principal diagnosis on the New York form. Consequently, the presence of specific diagnoses are likely to be underestimated in New York relative to Rhode Island and NHC. The items based on diagnosis codes in these models are affective mental disorder, schizophrenia or mental retardation, and brain syndrome.

The item indicating whether a resident received therapies was modified to accommodate differences between the Rhode Island and New York data. This item is coded as "1=yes" if a resident is receiving any one (or more) of a list of services, and "0=no" if none are received. The therapies chosen for inclusion in this list are not individually identical to those in the original model. However, the objective of the measure as a whole remained the same: the



identification of residents with particularly complex or acute medical needs, as reflected by their receipt of specialized therapies. Five service items were included in the original model; only three of these are available in the New York data. Those included are respiratory care, physical therapy and occupational therapy. Those not available were speech therapy and range of motion therapy.

The skilled services item was also modified to accommodate the different information available in the New York data. The construction of this item was similar to the therapies item: if a resident is receiving any of a series of services, the item is coded as "1=yes"; if none are received, it was scored "0=no". As in the therapies item, the individual services included are not identical to those in the original model, but the overall measures are comparable. Several of the items included in the original model were modified. The items included in the New York models were tracheostomy care, parenteral feeding, naso-gastric feeding, transfusions, oxygen, and presence of catheter. Two of the service items found in the Rhode Island data, skin care and injections, were not available on the New York assessment instrument.

The presence of disruptive behaviors was defined in the original model as noisiness, abusiveness (physical or verbal), wandering, disrobing, and other similar actions. If any of these were present, the item was coded as "1=yes"; if none are indicated, the item was coded as "0=no". The items in the New York data are limited to three: verbal disruption, physical aggression, and disruptive behavior.

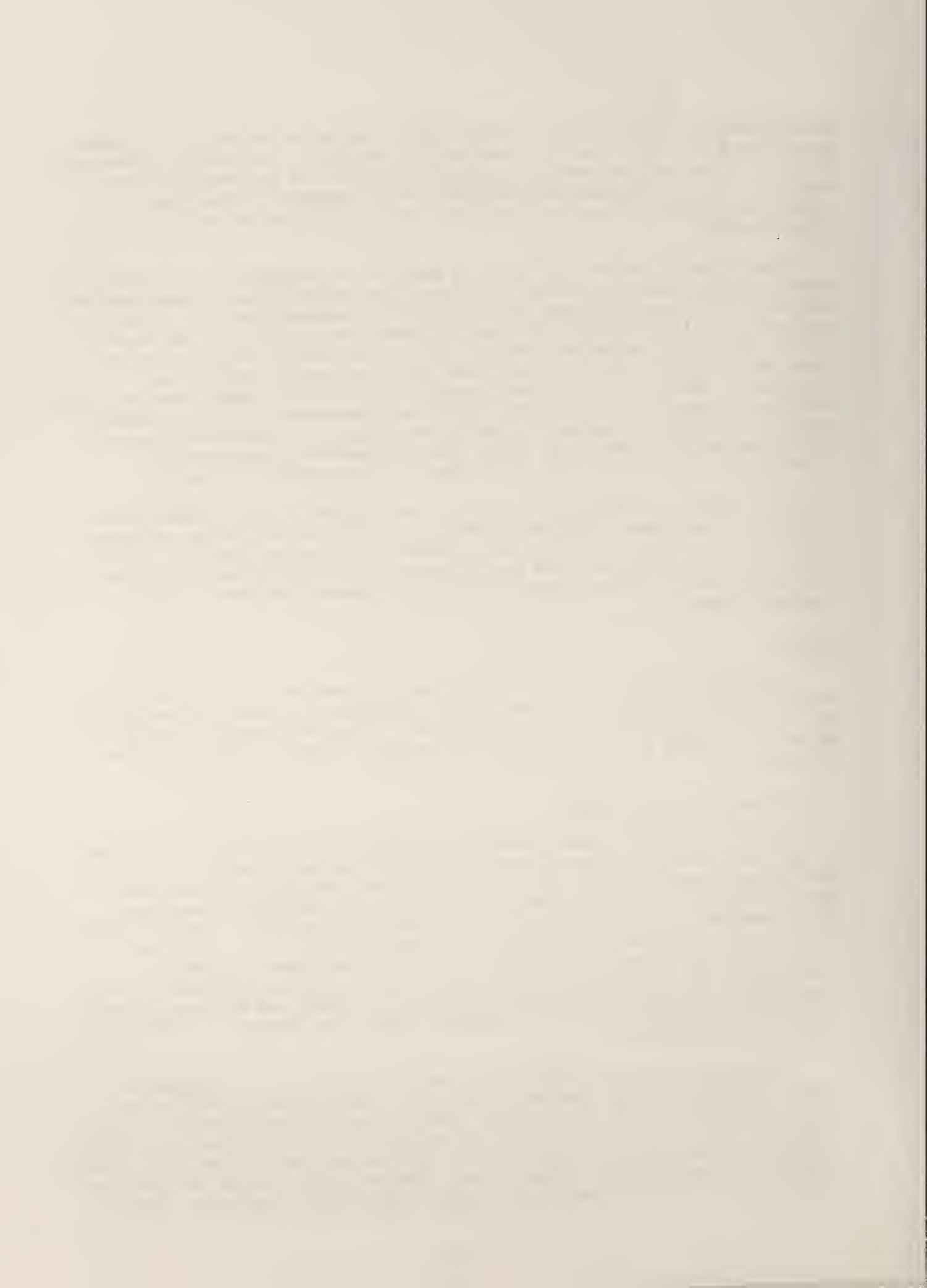
## Results

There were 11,795 residents in the New York data set. Of those, 7,782 were eligible to improve (i.e. not in the independent or other ADL categories), and 7,021 were eligible to decline (i.e. not in the most dependent or other groups). Of these eligible groups, 31.4 percent improved, and 43.5 percent declined.

### Decline: New York model

The relationship between likelihood of decline and ADL score at the time of the first assessment was not ordinal. Those residents with one dependency were almost twice as likely (O.R. = 1.92) to have declined over the course of the study period relative to the reference group of independent residents. Those dependent in transferring and one other activity (ADL 2) were one third less likely to decline than those with no dependencies (O.R. = .66), but approximately 20 percent less likely to decline than those with three dependencies who needed help eating (O.R. = .25). The ADL 3 category (those dependent in all three activities who need help eating) was not statistically significantly different from the reference group with respect to likelihood of decline (See Table 9-3).

The odds ratios for the affective mental disorder and schizophrenia or mental retardation items indicated that those with diagnoses of affective mental disorder were 25 percent more likely to decline than those without this diagnosis (O.R. = 1.25), and those with diagnoses of schizophrenia or mental retardation about half as likely (O.R. = .56) to decline as those without these diagnoses. Residents with organic brain syndrome were about 60 percent more likely (O.R. = 1.61) to decline than those without this diagnosis. Finally,





those exhibiting disruptive behavior were slightly (O.R. = 1.13) more likely to decline than other residents.

#### Decline: Comparison of New York and Rhode Island models

With the exception of one item (affective mental disorder), each of the terms in the two models indicated an effect in the same direction, although the magnitude of the effects differed. The ADL scales, overall, for these two models indicated a similar trend: decline is less likely with decreasing dependency. One component of the ADL measure, the group of residents with three dependencies who need help feeding, was not significant in New York, where in Rhode Island each ADL level was found to differ significantly from the reference group of independent residents. In New York, the ADL 1 group was almost twice as likely (O.R. = 1.92) to decline as was the reference group; in Rhode Island this group was one third less likely (O.R. = .61) to decline than the reference group.

The odds ratios for the schizophrenia or mental retardation variables were quite similar in the two models, indicating that residents with either of these conditions were approximately half as likely to decline as those without these conditions. Those with organic brain syndrome were at higher risk of decline in both models; in Rhode Island, the likelihood of decline was 41 percent higher with this diagnosis (O.R. = 1.41), and in New York it was 61 percent higher (O.R. = 1.61). Disruptive behavior was also associated with higher likelihood of decline, but more so in Rhode Island (O.R. = 1.42) than in New York (O.R. = 1.13).

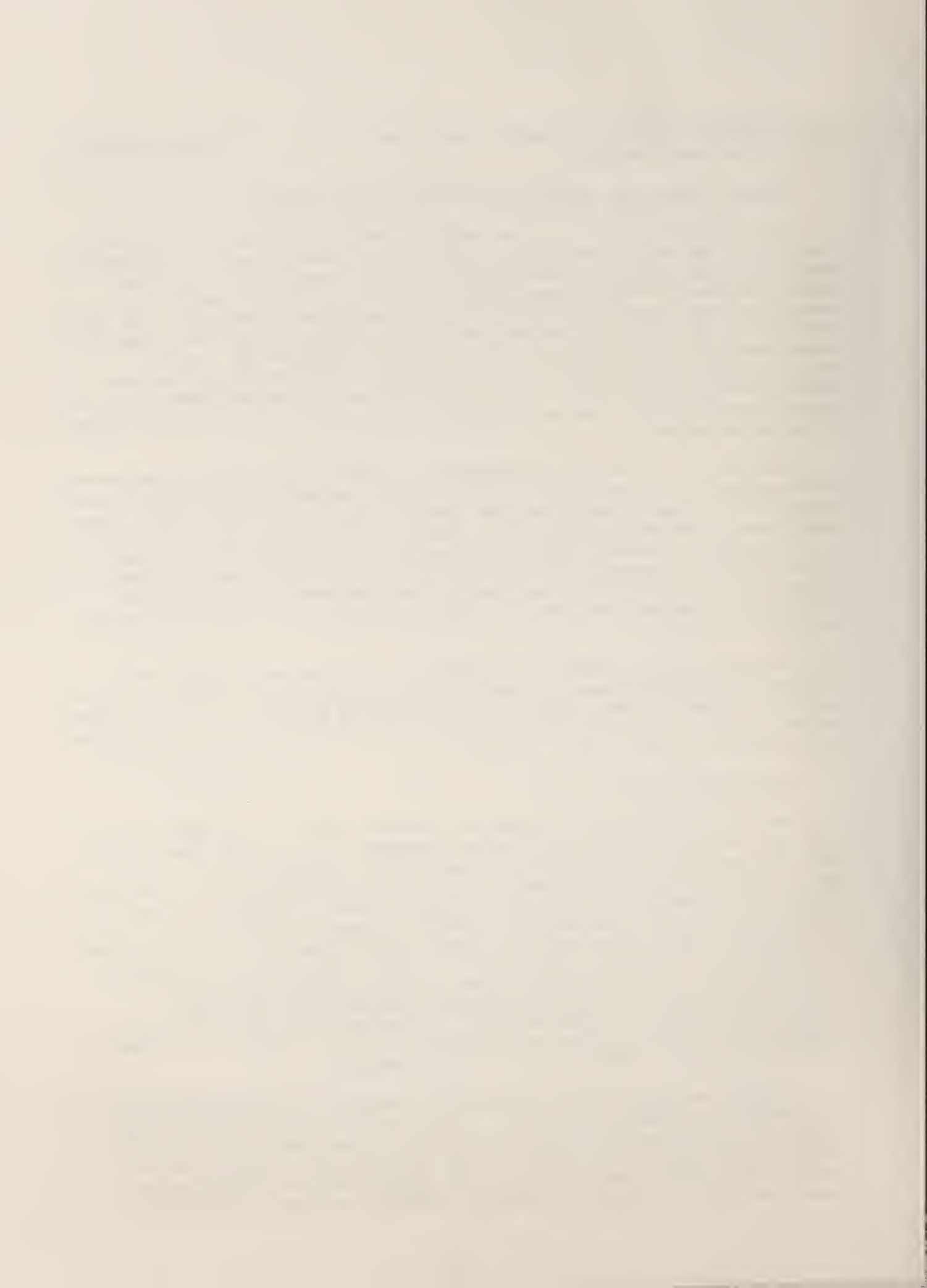
Affective mental disorder, identified in both data sets through the listings of diagnosis codes, was significant in different directions in the two models. In Rhode Island, those with this condition were one third less likely to decline (O.R. = .64); in New York, those with this condition were 25 percent more likely to decline (O.R. = 1.25).

#### Improvement: New York model

Relative to the reference group of residents aged 70 to 89 years, those less than 70 were slightly more likely to improve (O.R. = 1.08), and those 90 years of age or more about 20 percent less likely to improve (O.R. = .81). Only the older age group differed statistically significant from the reference group. The ADL scale indicated a non-ordinal pattern. Relative to those residents in the most dysfunctional category (dependent in all three activities and unable to feed), those with one dependency were approximately two and one half times more likely to improve (O.R. = 2.59); those who were dependent in transferring and one other activity were about 20 percent less likely to improve (O.R. = .84). This latter group of residents did not differ significantly from the reference group. The group of residents who were dependent in three activities and needed help eating was three and one half times more likely to improve (O.R. = 3.50) (See Table 9-4).

There is no information about mental impairment in the New York data; that item was not included in this model. Those residents identified as having affective mental disorder were about 20 percent less likely to improve than those without this disorder (O.R. = .81), although this variable was not statistically significant in the New York model. The odds ratios for the remaining items -- receipt of therapies, skilled services, and disruptive





behavior -- each indicated a slightly elevated likelihood of improvement, all less than 11 percent, but none of these terms were statistically significant in the New York model for improvement.

#### Improvement: Comparison of New York and Rhode Island models

Four of the seven items which were significant in the Rhode Island model were not significant in the New York model: affective mental disorder, disruptive behavior, and receipt of therapies or skilled services. In addition to not being significant in the New York model, the odds ratios for these variables indicated that the effect of these items was in a different direction in the New York model compared to the Rhode Island. For example, in Rhode Island, a diagnosis of affective mental disorder was related to a 75 percent increase in the likelihood of improvement (O.R. = 1.76); in New York, it was related to a 20 percent decrease in the likelihood of improvement (O.R. = .81). A fifth item, severe mental impairment, which was a significant item in the Rhode Island model, could not be included in the New York model. The ADL scales are not directly comparable, since the items included in the scales are different and the reference groups include different categories of residents. The age items indicate the same pattern, with older residents significantly less likely to improve than younger residents, although this trend is more marked in the Rhode Island model than the New York model (See Table 9-4).

#### National Health Corporation Data

The information available from the NHC assessment instrument is similar to that collected in Rhode Island, from which the models were originally constructed. Only minor modifications to the original model were required. These modifications are indicated below, as is the recoding that was performed on the NHC data to create the categories necessary to complete the models.

#### Independent variables

The three age groups used in the original model (70 years of age or under; over 70 to 89; 90 or over) were retained. The original model contains an item measuring length of stay for that episode, dichotomized as 3 months or less and more than 3 months. This item was constructed in NHC, based on the assessment date and the admission date.

The NHC assessment instrument contains information about all of the activities of daily living which are included in the original model. These items had originally been coded on a three-level scale: independent, requires help, and unable to perform an activity. These scores were recoded dichotomously, with the requires help and unable to perform categories representing dependence. The six-item ADL scale was constructed as follows:

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DIVISION OF THE PHYSICAL SCIENCES  
DEPARTMENT OF CHEMISTRY

RESEARCH REPORT NO. 1000

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- 0=independent in all six activities
- 1=one dependency
- 2=dependent in bathing + one other activity
- 3=dependent in bathing, dressing + one other activity
- 4=dependent in bathing, dressing, toileting + one other activity
- 5=dependent in bathing, dressing, toileting, transferring + one other activity
- 6A=dependent in all six activities; needs help feeding
- 6B=dependent in all six activities; unable to feed
- 7=other.

Those in the other group at either the initial or follow-up assessments were excluded from these analyses.

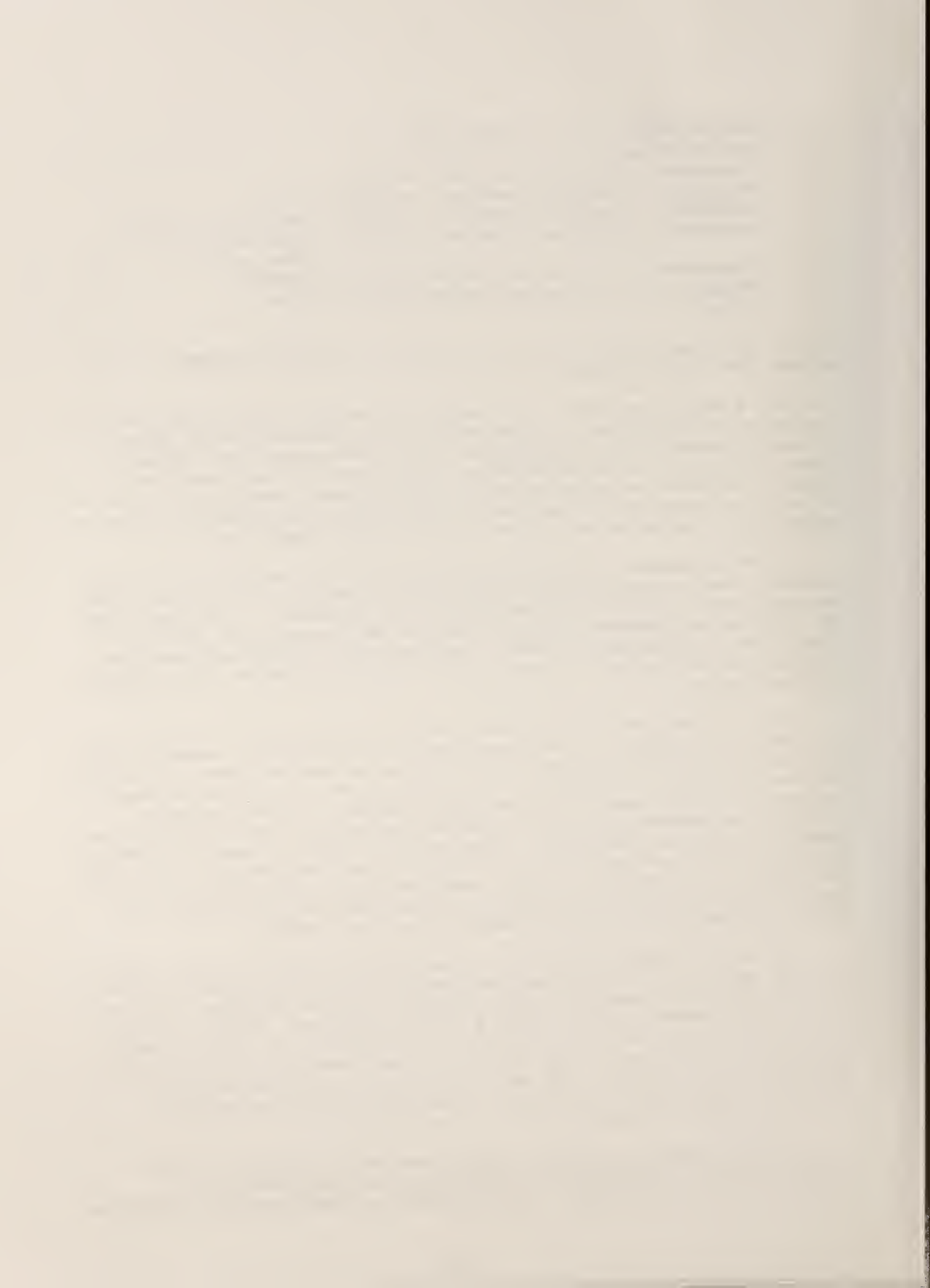
Severe mental impairment is defined in the original model on the basis of a mental status questionnaire. The "orientation" item from the NHC instrument was used in place of this questionnaire. This item assesses the resident's status, taking into account orientation with respect to time, place, and person. A resident was coded as having a severe mental impairment if he or she was scored as occasionally disoriented or disoriented; those coded as clear or comatose were considered not to have a severe mental impairment.

The NHC assessment instrument collects information on up to nine current diagnoses; the instrument used in Rhode Island to collect the data from which the models were constructed collects up to five diagnoses. It is likely that the reporting of diagnoses will be similar in the two data sets, but perhaps slightly more comprehensive in NHC. The items based on diagnosis codes are affective mental disorder, schizophrenia or mental retardation, brain syndrome, COPD, and cancer.

The therapies item in the original model was based on the receipt of any of a number of therapies; if any were listed in the resident's record as having been received as of the previous week, the item is coded as 1=yes; if none were received during that time period, it is coded as 0=no. This item is basically the same in the NHC model, with minor modifications. The NHC instrument instructs the assessor to code a therapy as received if it was received at any point since the last assessment, a time period of either 30 days or 90 days, depending on the resident's status. In Rhode Island, the therapies were coded as received if the resident's record indicated their receipt as of the previous week. Therapies included are the same as those included in the Rhode Island model, with inhalation therapy replacing respiratory therapy.

The skilled care services item is constructed similarly to the therapies item: if any of a list of services are received, the item is coded as 1=yes; if none were received, then it is coded as 0=no. As in the therapies item, the time periods covered by these items is slightly different. Instead of coding the receipt of services as of last week, the variable on the NHC instrument indicates whether a service was received for any consecutive five day period since the last assessment. The services included are special skin care, decubitus care; multiple injections; tracheostomy care or ostomy care; irrigations/special catheter care; IV; tube feeding.

The NHC disruptive behavior variable assesses the resident's usual behavior pattern as appropriate; inappropriate and non-threatening; or inappropriate and threatening. Those assessed as appropriate were considered





to display no disruptive behavior, and the other two categories were considered disruptive.

## Results

The NHC data set contained 4,595 residents. During the study period, 10.6 percent of these residents died. Those residents eligible to improve or decline were those who were not discharged or had not died by the time of the follow-up assessment, and were not in the least or most dysfunctional group, respectively, or in the other category. Of the 2,794 residents eligible to improve, 19.1 percent did so; of the 2,257 eligible to decline, 27.9 percent did so.

### Death: National Health Corporation model

Women were about 40 percent less likely to die than men (O.R. = .63). Both of the older age groups (70 to 89 years of age and 90 years of age or over) were more likely to die than the reference group of residents aged under 70 years, with death most likely in the older age group (O.R. = 1.54 and 2.58, respectively). Those residents with a length of stay of more than 90 days were half as likely to die as those with shorter lengths of stay (O.R. = .49). The odds of dying increased markedly with increasing dysfunction: the odds ratio for the combined ADL 3, 4 and 5 category was 2.48; that for the 6A category was 4.06, and for the 6B category 11.67. The probability of death was approximately 60 percent higher for those residents with a diagnosis of cancer (O.R. = 1.63). The diagnosis of COPD did not significantly add to the risk of death. The receipt of rehabilitative therapies was associated with a lower probability of death (O.R. = .67); the receipt of skilled services was associated with a probability of death approximately 90 percent higher (O.R. = 1.90) (See Table 9-2).

### Death: Comparison of Rhode Island and NHC models

Only one of the items that was significant in the Rhode Island model (COPD) was not significant in the NHC model. With the exception of the item indicating the receipt of therapies, the odds ratios for the items in both models indicate effects in the same direction, although each of the odds ratios for these items in the Rhode Island models is of greater magnitude than in the NHC models. Women were less likely to die in both models. Increasing age was associated with greater risk of death in both models. Those with longer lengths of stay were less likely to die in both models, as were the more ADL-dependent residents. A diagnosis of cancer increased the likelihood of death in both models, as did the receipt of skilled services. The deviation from this pattern was the receipt of therapies, which increased the odds ratio in the Rhode Island model (O.R. = 1.52), but resulted in a reduced probability of death in the NHC model (O.R. = 0.67) (See Table 9-2).

### Decline: National Health Corporation model

Three of the five ADL categories differed significantly from the reference group (those with no dependencies) with respect to the likelihood of decline. Those in the ADL 2 category (dependent in bathing and one other activity), the combined 4 and 5 group (dependent in bathing, dressing, toileting + one activity and bathing, dressing, toileting, transferring + one activity), and group 6 (those residents dependent in all six activities who need help feeding)



had a probability of decline that was about half that of the reference group (O.R. = .51, .45 and .54, respectively) (See Table 9-3).

Residents with diagnoses of schizophrenia or mental retardation were significantly less likely to decline (O.R. = .58) than those without these diagnoses. Those exhibiting disruptive behavior were 50 percent more likely (O.R. = 1.50) to decline than those without these behaviors. The affective mental disorder and organic brain syndrome items indicated a slightly higher probability of decline, but neither item was statistically significant.

#### Decline: Comparison of Rhode Island and NHC models

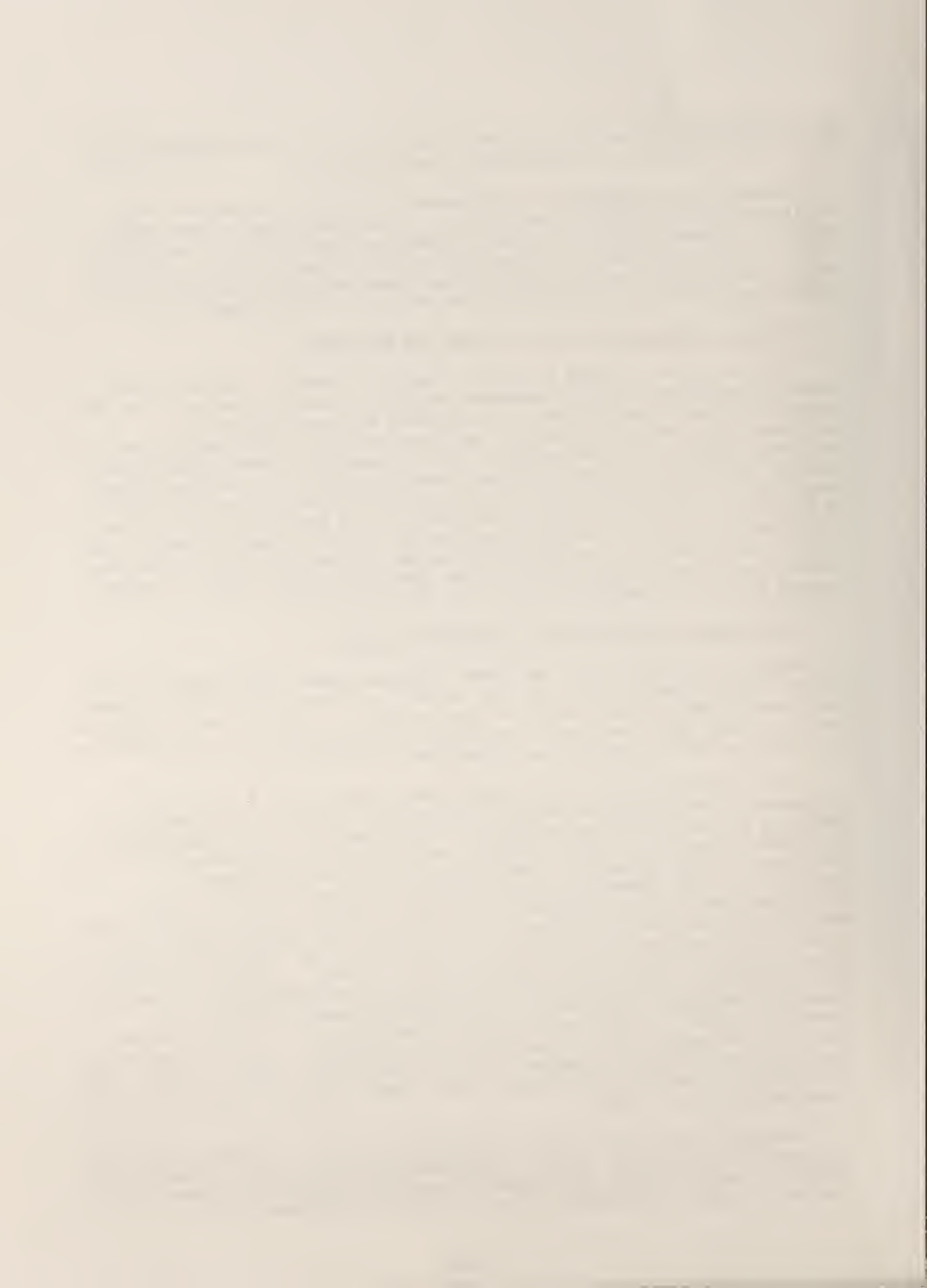
The ADL scales in these two models indicate a similar overall pattern: those residents who were more dependent were less likely to decline. The odds ratios and level of significance for residents who had diagnoses of schizophrenia or mental retardation and those who exhibited disruptive behavior were very similar in the two models. The two remaining items, organic brain syndrome and affective mental disorder, were significant in the Rhode Island model, but not in the NHC model. The organic brain syndrome variable indicated an increased risk of decline than that found in the Rhode Island model. The direction of the effects was different for the affective mental disorder item. In NHC, the diagnosis of an affective disorder increased the risk of decline, although not significantly, while in the Rhode Island model such a diagnosis reduced the risk of decline by one third (See Table 9-3).

#### Improvement: National Health Corporation model

Relative to those in the age 70-89 reference group, those under 70 years of age were as likely to improve (O.R. = .99), and those who were 90 or over were about 25 percent less likely to improve (O.R. = .75). The small difference for the younger age group was not statistically significant; the difference in the older age group, however, was significant (See Table 9-4).

All categories of the ADL variables were significantly related to improvement. The reference category for the ADL variable in the improvement model was residents with one dependency. This group had a low likelihood of improvement. Relative to this category, residents who were dependent in all six activities and who needed help feeding had the highest likelihood of improvement, being almost ten times more likely to improve (O.R. = 9.51). Those residents who were dependent in bathing, dressing, and one other activity were almost nine times more likely to improve than the reference group (O.R. = 8.54), while those who were dependent in bathing and one other activity were about seven times more likely to improve (O.R. = 6.88). Residents with four or five dependencies (bathing, dressing, toileting + one dependency; or bathing, dressing, toileting, transferring + one) had the lowest likelihood of improvement (O.R. = 5.33), but were still five times more likely to improve than the reference category (those with one dependency). For residents in the most dependent category (dependent in six activities and unable to feed), the likelihood of improvement was only slightly higher than for those with 4 or 5 dependencies (O.R. = 5.85).

Residents with severe mental impairment were about 40 percent less likely to improve than residents without this condition (O.R. = .60). Residents with affective mental disorder were almost 10 percent less likely to improve than residents without this disorder (O.R. = .92); this difference was not





statistically significant. Those residents receiving rehabilitative therapies were approximately 25 percent less likely to improve than those who did not receive therapies (O.R. = .72). Similarly, those receiving skilled services were also about 25 percent less likely to improve (O.R. = .77). Residents exhibiting disruptive behavior were almost 20 percent less likely to improve (O.R. = .81).

#### Improvement: Comparison of Rhode Island and NHC models

Only one of the seven constructs that were significant elements of the Rhode Island model (affective mental disorder) was not significant in the NHC model. The affects of age, therapies, skilled services, mental impairment, and disruptive behavior were similar in direction and magnitude in the two data sets (See Table 9-4).

The ADL scales were statistically significant components of the improvement models in both data sets. Different reference groups were selected in Rhode Island and in NHC on the basis of preliminary bivariate analyses of the relationship between ADL level and the outcome. In both data sets, those with one dependency were the least likely to improve. The main difference between the two ADL scales was that few in the reference group (those with one dependency) improved in NHC. In Rhode Island, those with one dependency were similar to those with four or more dependencies with respect to the proportion improving during the study period; the rate of improvement was similar for those in categories 4 and 5. These residents were grouped together as the reference category. In NHC, those dependent in all six ADLs and who needed help feeding were nearly ten times as likely to improve as was the reference group (O.R. = 9.51); those unable to feed in addition to being dependent in all six ADLs were only about six times as likely to improve as the reference group (O.R. = 5.84). The information required to make this distinction was not available in the Rhode Island data.

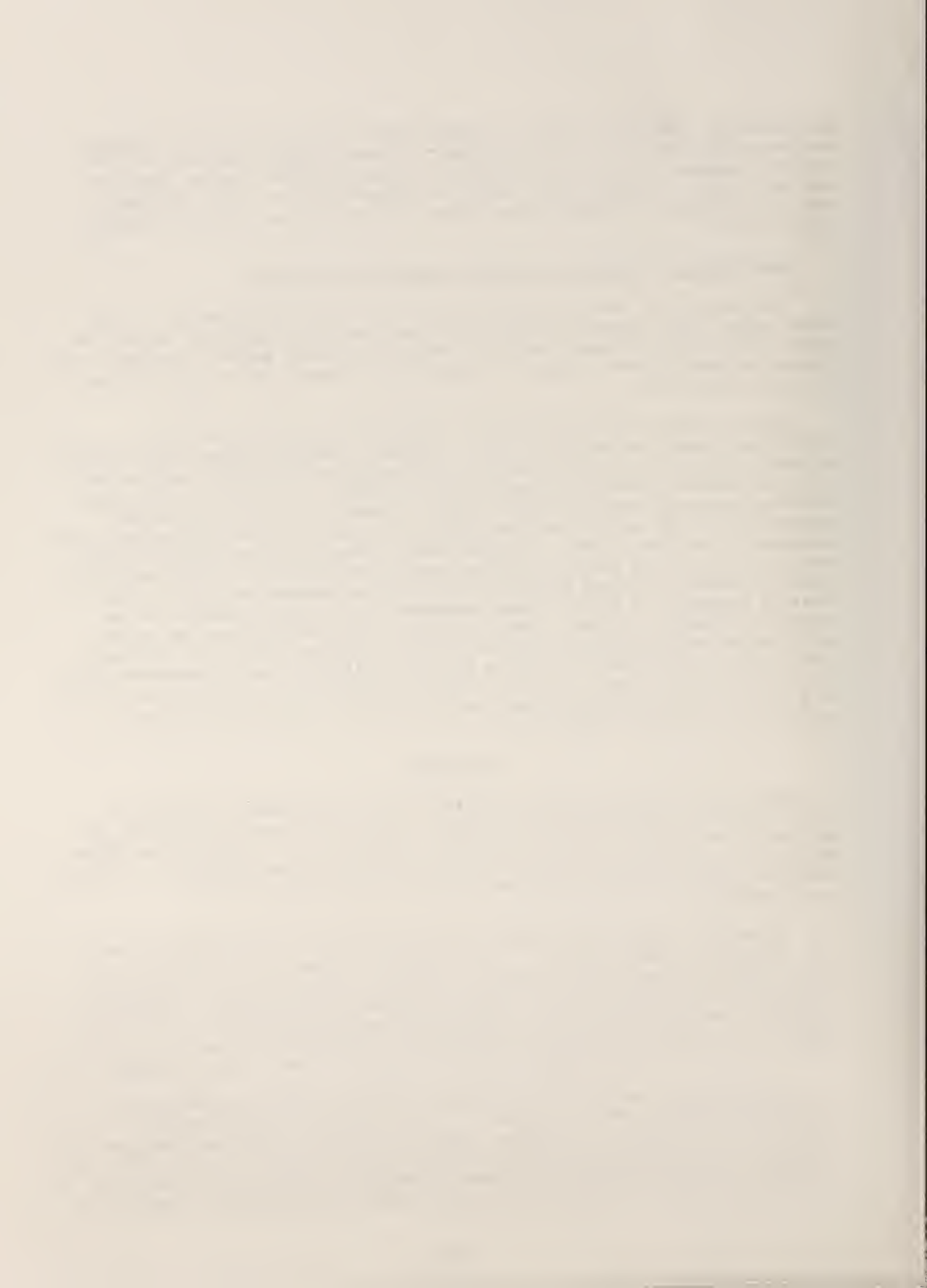
#### Conclusion

The overall purpose of this validation was to determine the degree to which predictive models created from data collected in Rhode Island could be applied to two similar data sets. Overall, the majority of items in the three models were related to the outcomes of interest in similar directions, although there was some variation in the magnitude and significance of the relationships.

In general, those items about which there was the least ambiguity were most consistent across data sets. For example, the age, sex, and length of stay variables showed almost identical patterns of direction and significance across the models and data sets. Those components of the models which were dependent upon variables with more system and assessment-specific definitions, such as the receipt of services or therapies, the presence of mental impairment, or the exhibition of disruptive behavior, were less consistent.

Of particular concern was the opposite direction of effect found with respect to affective mental disorder. This grouping of conditions was identified on the basis of diagnosis codes; in New York, only one diagnosis was recorded, as compared to up to five in Rhode Island and up to nine in NHC. It is likely that this differential number of reported diagnoses is responsible for the difference in effects. The type of person whose primary diagnosis is





affective disorder may be very different from one who receives this as a secondary diagnosis. In addition, the use of this diagnosis for nursing home residents may reflect different physician practice patterns and differing patterns of deinstitutionalization from mental institutions.

A similar explanation is possible for the differences in effects relative to the receipt of therapies. Nursing home chains and state regulatory systems differ with respect to the requirements for receipt of therapies; in different systems, different regulations exist requiring the provision of certain services to specific types of residents. The resulting variation may explain some of the variation in effects of this item in the predictive models.

In conclusion, this analysis has provided empirical evidence of the relationship of a variety of resident-specific covariates to quality-related outcomes. Despite the differences in resident populations and differences in the construction of the dependent and independent variables, the relationships for some of the variables were quite robust across data sets, especially when comparing the NHC and Rhode Island data, which had the most similar definitions. For other factors, particularly those susceptible to variations in practice patterns, differences in definitions used to collect the data, and state and facility policies, relationships did not hold. This highlights the importance of developing a common set of data items for comparison of nursing homes and nursing home populations.

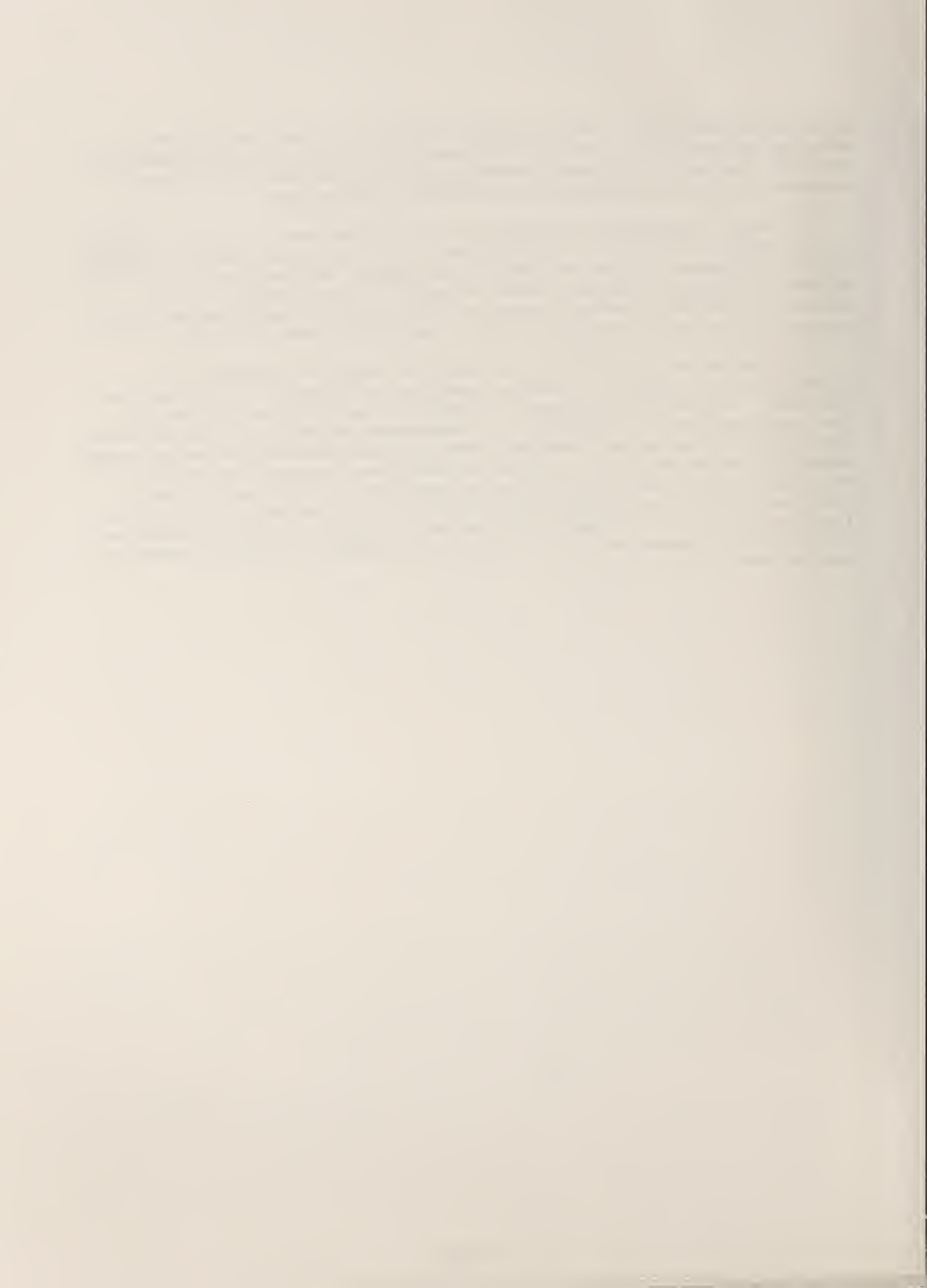


Table 9-1

Diagnosis categories used in models predicting death, decline and improvement

Brain syndrome: ICD-9 codes 290.00 - 290.99, 291.00 - 294.99, 331.00 - 331.99, and 797.00 - 797.99.

This category includes dementia, alcoholic psychoses, drug psychoses, transient and chronic psychotic conditions, Alzheimer's disease and other cerebral degenerations, and senility.

Schizophrenia or mental retardation: ICD-9 codes 295.00 - 295.99 and 317.00 - 319.99.

Schizophrenia is defined as any of a group of severe, usually psychotic, emotional disorders.

Affective mental disorders: ICD-9 codes 296.00 - 316.99.

This group of diagnoses contains affective psychoses, paranoid states, neurotic disorders such as anxiety, hysteria and phobias, personality disorders, sexual disorders, alcohol dependence syndrome, drug dependence, non-dependent abuse of drugs, other syndromes including anorexia nervosa and tics, acute reaction to stress, adjustment reaction, nonpsychotic mental disorders, depressive disorders, and disturbance of conduct.

Chronic obstructive pulmonary disease (COPD): ICD-9 codes 491.00 - 492.99 and 496.00 - 496.99.

Included in the chronic obstructive pulmonary disease category are bronchitis, emphysema, and other unclassified conditions obstructing the airway.

Stroke: ICD-9 codes 436.00 - 436.99.

Stroke is defined as a sudden and severe attack due to acute lesions (e.g., hemorrhage or rupturing aneurysm) in the brain and usually causing permanent neurologic damage.

Ischemic heart disease: ICD-9 codes 410.00 - 414.99.

Included in this diagnosis grouping are myocardial infarction, angina, coronary atherosclerosis.

Hip fracture: ICD-9 codes 820.00 - 820.99.

This category includes all types of fractures of the neck of the femur.

Cancer: ICD-9 codes 140 - 239.99.

This group of diagnoses includes malignant neoplasms of any anatomical site.

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Table 9-2

Adjusted odds ratios and (95% confidence intervals) for models predicting death, Rhode Island and National Health Corporation models.

	Rhode Island		National Health Corporation		
Female	0.72	(0.51,1.01)	0.63*	(0.50,0.73)	
Age					
<=70	ref		ref		
70-89	3.32*	(1.57,7.02)	1.54*	(1.14,2.07)	
>=90	4.79*	(2.22,10.34)	2.48*	(1.72,3.57)	
LOS					
<= 90 days	ref		ref		
> 90 days	0.61*	(0.43,0.86)	0.49*	(0.40,0.60)	
ADL					
0,1,2	ref		0,1,2	ref	
3,4,5,8	2.75*	(1.86,4.05)	3,4,5	2.48*	(1.47,4.13)
6	4.80*	(3.16,7.30)	6A	4.06*	(2.32,7.10)
			6B	11.67*	(6.91,19.69)
Cancer	2.20*	(1.43,3.38)	1.63*	(1.32,2.01)	
COPD	1.91*	(1.17,3.31)	1.05	(0.69,1.60)	
Therapies	1.52*	(1.13,2.05)	0.67*	(0.54,0.84)	
Skilled Services	1.35*	(1.00,1.82)	1.90*	(1.52,2.37)	

\* = p < .05

Note: See accompanying text for information about differences in definitions across data sets.

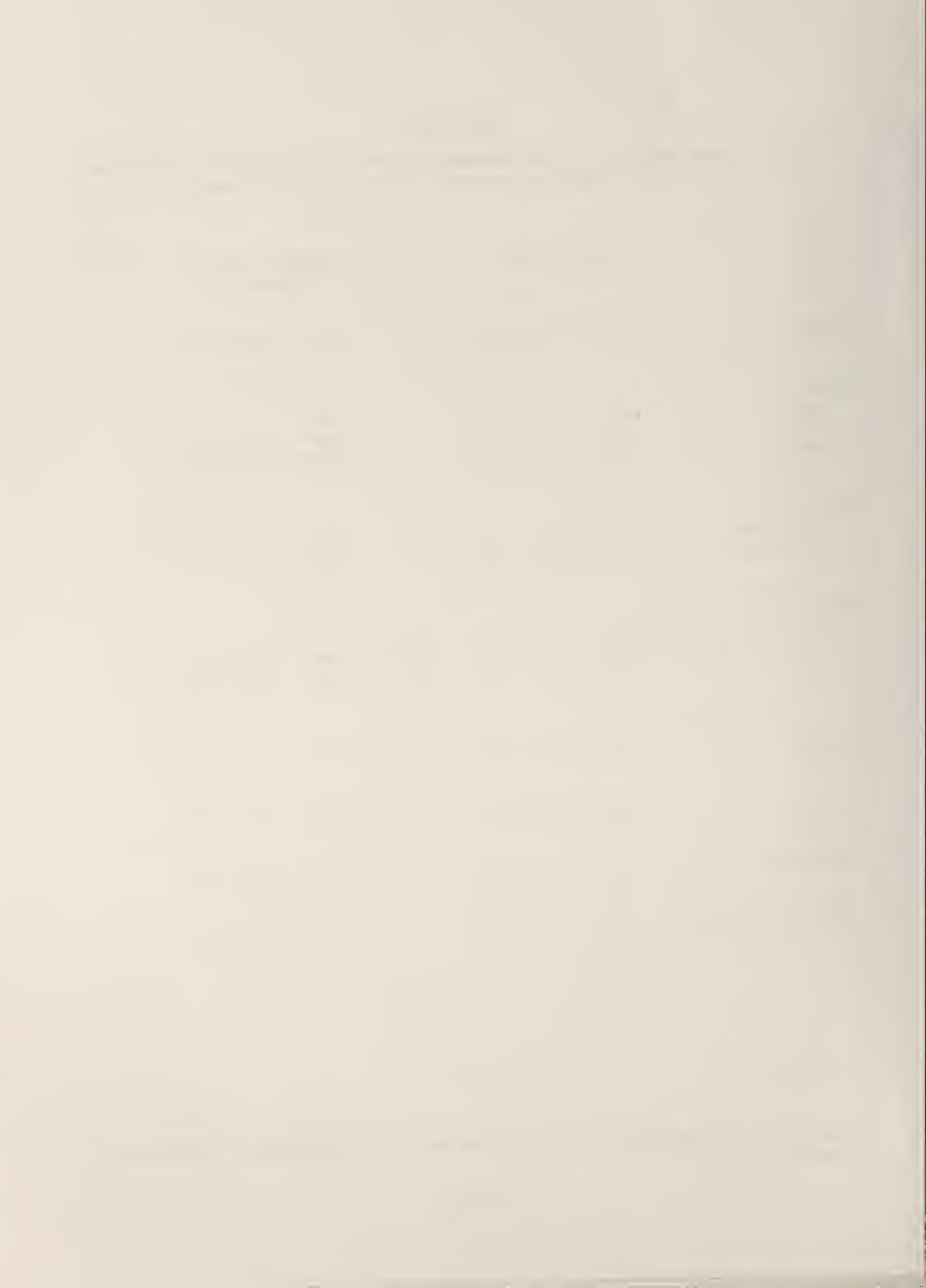


Table 9-3

Adjusted odds ratios and (95% confidence intervals) for models predicting decline, Rhode Island, New York and National Health Corporation models

	Rhode Island		New York		National Health Corporation	
ADL	0	ref	0	ref	0	ref
	1	0.61* (0.45,0.82)	1	1.92* (1.60,2.30)	1	0.90 (0.56,1.44)
	2	0.43* (0.30,0.63)	2	0.66* (0.57,0.76)	2	0.51* (0.33,0.80)
	3,4,5	0.29* (0.22,0.39)	3	0.85 (0.72,1.01)	3	1.08 (0.64,1.82)
					4,5	0.45* (0.30,0.66)
					6A	0.54* (0.35,0.83)
Affective Mental Disorder		0.64* (0.47,0.88)		1.25* (1.02,1.52)		1.12 (0.90,1.39)
Schizophrenia or Mental Retardation		0.50* (0.36,0.70)		0.56* (0.34,0.91)		0.58* (0.36,0.95)
Brain Syndrome		1.41* (1.11,1.78)		1.61* (1.42,1.82)		1.19 (0.91,1.55)
Disruptive Behavior		1.42* (1.11,1.84)		1.13* (1.00,1.27)		1.50* (1.20,1.88)

\* =  $p < .05$

Note: See accompanying text for information about differences in definitions across data sets.

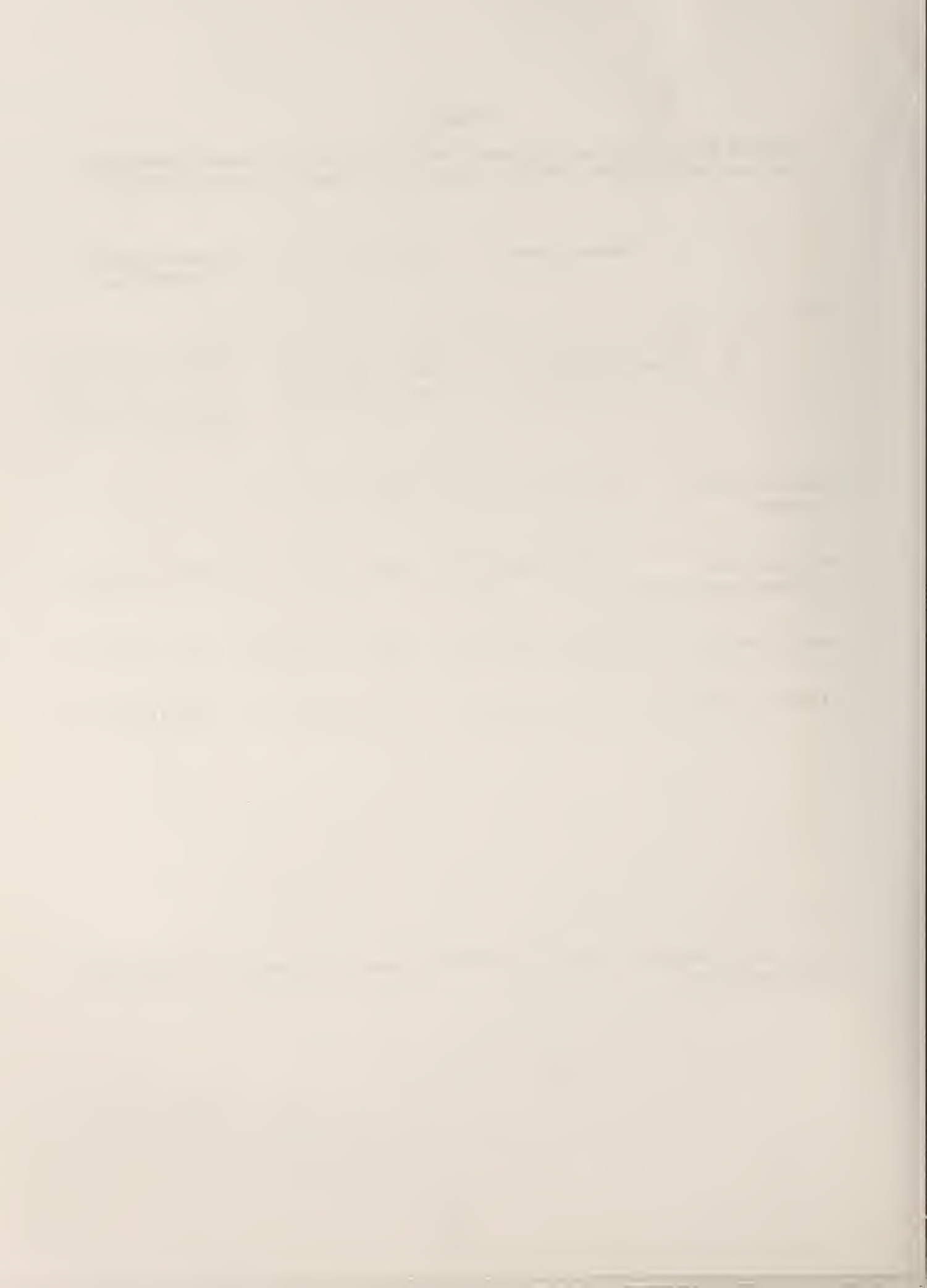


Table 9-4

Adjusted odds ratios and (95% confidence intervals) for models predicting improvement, Rhode Island, New York and National Health Corporation models

		Rhode Island		New York		National Health Corporation
Age						
<=70		1.39 (0.92,2.10)		1.08 (0.83,1.39)		0.99 (0.75,1.31)
70-89		ref		ref		ref
>=90		0.68* (0.48,0.94)		0.81* (0.68,0.97)		0.75* (0.57,0.98)
ADL	1,4,5,6	ref	1	2.59* (2.04,3.30)	1	ref
	2	1.51* (1.05,2.19)	2	0.84 (0.69,1.04)	2	6.88* (3.45,13.71)
	3	2.62* (1.67,4.10)	3	3.50* (2.85,4.28)	3	8.54* (4.01,18.20)
			4	ref	4,5	5.33* (2.76,10.30)
					6A	9.51* (4.77,18.98)
					6B	5.84* (2.89,11.82)
Severe Mental Impairment		0.74* (0.56,0.97)		NA		0.60* (0.47,0.77)
Affective Mental Disorder		1.76* (1.22,2.54)		0.81 (0.60,1.09)		0.92 (0.73,1.16)
Therapies		0.71* (0.52,0.97)		1.11 (0.95,1.31)		0.72* (0.57,0.90)
Skilled Services		0.80 (0.61,1.05)		1.06 (0.89,1.27)		0.77* (0.61,0.98)
Disruptive Behavior		0.68* (0.49,0.93)		1.03 (0.89,1.21)		0.81* (0.63,1.04)

\* = p < .05

Note: See accompanying text for information about differences in definitions across data sets.



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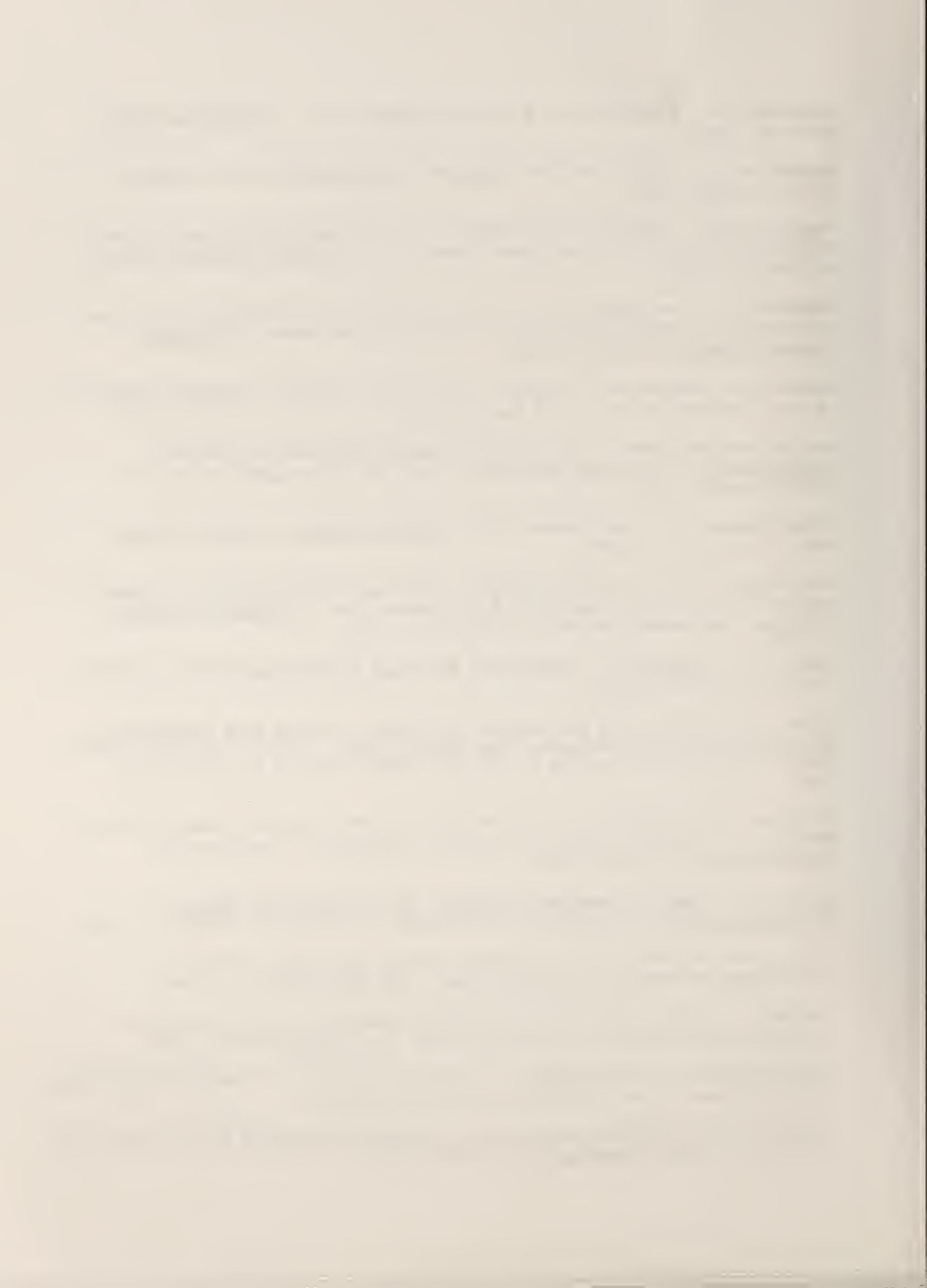
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